> *restart;# elecronic neutrino Gravitatie; Compile time 6 sec; gravDimensional*

> $de := diff(g(r), r\$2) = r\cdot\dfrac{g(r)}{a\cdot R}$ ;#where dim [a] = $[L^2]$ = meter; a = 1 meter$^2$ **for** *any dimension* $[g(r)]$;

$$de := \frac{d^2}{dr^2}\, g(r) = \frac{r\, g(r)}{a\, R} \qquad (1)$$

> *ics* $:= g(2\cdot R) = 0,\ D(g)(0) = b\cdot R$; # *where dim [b]* $=[L^{-2}]\cdot dim[g] = 1\ \ meter^{-2\frac{1}{2}} = \left[L^{-\frac{5}{2}}\right]$; **and** $dim[g] = \left[L^{-\frac{1}{2}}\right]$;

$$ics := g(2\,R) = 0,\ \mathrm{D}(g)(0) = b\,R \qquad (2)$$

> *sol* $:=$ *dsolve*$(\{de, ics\})$;

$$sol := g(r) = \frac{2\, b\, R\, \pi\, \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) \mathrm{AiryAi}\left(-\left(-\frac{1}{a\,R}\right)^{1/3} r\right)}{\Gamma\left(\frac{2}{3}\right)\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) + \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) 3^{1/6}\right)} - \frac{2\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) b\, R\, \pi\, \mathrm{AiryBi}\left(-\left(-\frac{1}{a\,R}\right)^{1/3} r\right)}{\Gamma\left(\frac{2}{3}\right)\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) + \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) 3^{1/6}\right)} \qquad (3)$$

> $g1(r) := rhs(sol)$;

$$g1 := r \mapsto rhs(sol) \qquad (4)$$

> $g1(0)$;

$$\frac{2\, b\, R\, \pi\, \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) \mathrm{AiryAi}\left(-\left(-\frac{1}{a\,R}\right)^{1/3} r\right)}{\Gamma\left(\frac{2}{3}\right)\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) + \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) 3^{1/6}\right)} - \frac{2\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) b\, R\, \pi\, \mathrm{AiryBi}\left(-\left(-\frac{1}{a\,R}\right)^{1/3} r\right)}{\Gamma\left(\frac{2}{3}\right)\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) + \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) 3^{1/6}\right)} \qquad (5)$$

> $g(r) := \dfrac{2\, b\, R\, \pi\, \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) \mathrm{AiryAi}\left(-\left(-\frac{1}{a\,R}\right)^{1/3} r\right)}{\Gamma\left(\frac{2}{3}\right)\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) + \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) 3^{1/6}\right)} - \dfrac{2\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) b\, R\, \pi\, \mathrm{AiryBi}\left(-\left(-\frac{1}{a\,R}\right)^{1/3} r\right)}{\Gamma\left(\frac{2}{3}\right)\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) + \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) 3^{1/6}\right)}$;

$$g := r \mapsto \left(2\cdot b\cdot R\cdot\pi\cdot \mathrm{AiryBi}\left(-2\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot R\right)\cdot \mathrm{AiryAi}\left(-\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot r\right)\right) \Big/ \left(\Gamma\left(\frac{2}{3}\right)\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3} \cdot\left(3^{2/3}\cdot \mathrm{AiryAi}\left(-2\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot R\right) + \mathrm{AiryBi}\left(-2\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot R\right)\cdot 3^{1/6}\right)\right) - \left(2\cdot \mathrm{AiryAi}\left(-2\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot R\right)\cdot b\cdot R\cdot\pi\cdot \mathrm{AiryBi}\left(-\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot r\right)\right) \Big/ \left(\Gamma\left(\frac{2}{3}\right)\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3} \qquad (6)$$

$$\cdot\left(3^{2/3}\cdot\mathrm{AiryAi}\left(-2\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot R\right)+\mathrm{AiryBi}\left(-2\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot R\right)\cdot 3^{1/6}\right)\right)$$

> # g(r)·∂u(t)/∂t + u(t)·∂g(r)/∂r·∂r/∂t = c·d ;# thus for r = 0 and t≠0 we have dim[d] = $\left[L^{-\frac{3}{2}}\right]$; u(t) adimensional; dim[d] = dim[g(r)·u(t)][$L^{-1}$]; *d unitary constant*

> $eq1 := (g(0)\cdot diff(u(t),t) + u(t)\cdot R\cdot b\cdot c - c\cdot d = 0);$

$$eq1 := \left(\frac{2\,b\,R\,\pi\,\mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)3^{1/3}}{3\,\Gamma\left(\frac{2}{3}\right)^2\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)+\mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)3^{1/6}\right)} - \frac{2\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)b\,R\,\pi\,3^{5/6}}{3\,\Gamma\left(\frac{2}{3}\right)^2\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)+\mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)3^{1/6}\right)}\right)\left(\frac{d}{dt}u(t)\right)+u(t)\,R\,b\,c-c\,d=0 \quad \textbf{(7)}$$

> $dsolve(eq1, u(t));$

$$u(t) = \left(\frac{d\,e^{-\frac{3\,c\,\Gamma\left(\frac{2}{3}\right)^2\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)+\mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)3^{1/6}\right)t}{2\pi\left(\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)3^{5/6}-\mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)3^{1/3}\right)}}}{b\,R} + \_C1\right)e^{-\frac{3\,c\,\Gamma\left(\frac{2}{3}\right)^2\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)+\mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)3^{1/6}\right)t}{2\pi\left(-\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)3^{5/6}+\mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)3^{1/3}\right)}} \quad \textbf{(8)}$$

> $simplify(dsolve(g(0)\cdot diff(u(t),t) + R\cdot b\cdot u(t)\cdot c - c\cdot d = 0));$

*# any term of adition has dim*= $\left[L^{-\frac{3}{2}}\right]\left[T^{-1}\right]$;

$$u(t) = \frac{\_C1\,b\,R\,e^{\frac{3\,c\,\Gamma\left(\frac{2}{3}\right)^2\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)+\mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)3^{1/6}\right)t}{2\pi\left(\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)3^{5/6}-\mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)3^{1/3}\right)}}+d}{b\,R} \quad \textbf{(9)}$$

> $$u(t) := \frac{d}{b\cdot R} + \_C1\cdot e^{-\frac{3\,c\,\Gamma\left(\frac{2}{3}\right)^2\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)+3^{1/6}\,\mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)\right)t}{2\pi\left(-\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)3^{5/6}+\mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3}R\right)3^{1/3}\right)}};$$

$$u := t \mapsto \frac{d}{b\cdot R} + \_C1\cdot e^{-\frac{3\cdot c\cdot\Gamma\left(\frac{2}{3}\right)^2\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot\left(3^{2/3}\cdot\mathrm{AiryAi}\left(-2\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot R\right)+\mathrm{AiryBi}\left(-2\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot R\right)\cdot 3^{1/6}\right)\cdot t}{2\cdot\pi\cdot\left(-\mathrm{AiryAi}\left(-2\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot R\right)\cdot 3^{5/6}+\mathrm{AiryBi}\left(-2\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot R\right)\cdot 3^{1/3}\right)}} \quad \textbf{(10)}$$

> $sol1 := u(t)\cdot g(r);$ *# H(r, t) = u(t)·g(r) has dimension* $\left[L^{-\frac{3}{2}}\right]$;

$$sol1 := \left( \frac{d}{b\,R} + C1\,\mathrm{e}^{-\frac{3\,c\,\Gamma\left(\frac{2}{3}\right)^2 \left(-\frac{1}{a\,R}\right)^{1/3} \left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) + \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) 3^{1/6}\right) t}{2\,\pi \left(-\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) 3^{5/6} + \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) 3^{1/3}\right)}} \left( \frac{2\,b\,R\,\pi\,\mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) \mathrm{AiryAi}\left(-\left(-\frac{1}{a\,R}\right)^{1/3} r\right)}{\Gamma\left(\frac{2}{3}\right)\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) + \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) 3^{1/6}\right)} - \frac{2\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) b\,R\,\pi\,\mathrm{AiryBi}\left(-\left(-\frac{1}{a\,R}\right)^{1/3} r\right)}{\Gamma\left(\frac{2}{3}\right)\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) + \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) 3^{1/6}\right)} \right) \right) \tag{11}$$

$$> H(r,t) := simplify\left(\left( \frac{d}{b\,R} + C1\,\mathrm{e}^{-\frac{3\,c\,\Gamma\left(\frac{2}{3}\right)^2 \left(-\frac{1}{a\,R}\right)^{1/3} \left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) + \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) 3^{1/6}\right) t}{2\,\pi \left(-\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) 3^{5/6} + \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) 3^{1/3}\right)}} \left( \frac{2\,b\,R\,\pi\,\mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) \mathrm{AiryAi}\left(-\left(-\frac{1}{a\,R}\right)^{1/3} r\right)}{\Gamma\left(\frac{2}{3}\right)\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) + \mathrm{AiryBi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) 3^{1/6}\right)} - \left(2\,\mathrm{AiryAi}\left(-2\left(-\frac{1}{a\,R}\right)^{1/3} R\right) b\,R\,\pi\,\mathrm{AiryBi}\left(-\left(-\frac{1}{a\,R}\right)^{1/3} r\right)\right) \Big/ \left(\Gamma\left(\frac{2}{3}\right)\left(-\frac{1}{a\,R}\right)^{1/3}\left(3^{2/3}\,\mathrm{Airy}\ldots {}^{3} R\right) 3^{1/6}\right)\right)\right)\right);$$

$$H := (r,t) \mapsto simplify\left(\left( \frac{d}{b \cdot R} + C1 \cdot \mathrm{e}^{-\frac{3 \cdot c \cdot \Gamma\left(\frac{2}{3}\right)^2 \cdot \left(-\frac{1}{a \cdot R}\right)^{1/3} \cdot \left(3^{2/3} \cdot \mathrm{AiryAi}\left(-2 \cdot \left(-\frac{1}{a \cdot R}\right)^{1/3} \cdot R\right) + \mathrm{AiryBi}\left(-2 \cdot \left(-\frac{1}{a \cdot R}\right)^{1/3} \cdot R\right) \cdot 3^{1/6}\right) \cdot t}{2 \cdot \pi \cdot \left(-\mathrm{AiryAi}\left(-2 \cdot \left(-\frac{1}{a \cdot R}\right)^{1/3} \cdot R\right) \cdot 3^{5/6} + \mathrm{AiryBi}\left(-2 \cdot \left(-\frac{1}{a \cdot R}\right)^{1/3} \cdot R\right) \cdot 3^{1/3}\right)}} \ldots\right.\right.$$

$$\cdot\Bigg(\Bigg(2\cdot b\cdot R\cdot\pi\cdot \mathrm{AiryBi}\left(-2\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot R\right)\cdot \mathrm{AiryAi}\left(-\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot r\right)\Bigg)\Bigg/\Bigg(\Gamma\left(\frac{2}{3}\right)\cdot\Bigg($$

$$-\frac{1}{a\cdot R}\Bigg)^{1/3}\cdot\left(3^{2/3}\cdot \mathrm{AiryAi}\left(-2\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot R\right)+\mathrm{AiryBi}\left(-2\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot R\right)\cdot 3^{1/6}\right)\Bigg)$$

$$-\Bigg(2\cdot \mathrm{AiryAi}\left(-2\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot R\right)\cdot b\cdot R\cdot\pi\cdot \mathrm{AiryBi}\left(-\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot r\right)\Bigg)\Bigg/\Bigg(\Gamma\left(\frac{2}{3}\right)\cdot\left(-\frac{1}{a\cdot R}\right)^{1/3}\cdot\Big(3^{2/3}\cdot A$$

$$\cdot 3^{1/6}\Big)\Bigg)\Bigg)\Bigg)$$

> #The Newton Law;

> restart;#FluxGravity;

> $eq1 := \frac{1}{c^2}\, diff(f(r,t),t,t) - diff(f(r,t),r,r) = 0;$

$$eq1 := \frac{\frac{\partial^2}{\partial t^2} f(r,t)}{c^2} - \frac{\partial^2}{\partial r^2} f(r,t) = 0 \quad \textbf{(13)}$$

> $iv1 := f(2\cdot R, 0) = 0, \mathrm{D}[1](f)(0,0) = -R\cdot b;$# another b equaual to 1 per meter with $dim(b) = [L]^{-2}$ **for** $dim\, f(r,t)$ adimensional;

$$iv1 := f(2R, 0) = 0, \mathrm{D}_1(f)(0,0) = -R\, b \quad \textbf{(14)}$$

> $Sol := pdsolve([eq1, iv1]);$

$$Sol := f(r,t) = \frac{\left(4R^2 b - 2Rbr + \_c_2 t^2 + 2\_C3\, t\right)c^2 + \left(-4R^2 + r^2\right)\_c_2}{2c^2} \quad \textbf{(15)}$$

> $F := \frac{pdsolve([eq1, iv1])}{4\cdot \mathrm{Pi}\cdot r^2};$

$$F := \frac{f(r,t)}{4\pi r^2} = \frac{\left(4R^2 b - 2Rbr + \_c_2 t^2 + 2\_C3\, t\right)c^2 + \left(-4R^2 + r^2\right)\_c_2}{8\pi r^2 c^2} \quad \textbf{(16)}$$

> $Fg1 := subs(t=0, F);$

$$Fg1 := \frac{f(r,0)}{4\pi r^2} = \frac{\left(4R^2 b - 2Rbr\right)c^2 + \left(-4R^2 + r^2\right)\_c_2}{8\pi r^2 c^2} \quad \textbf{(17)}$$

> $Fg1 := \frac{\left(4bR^2 - 2Rbr\right)c^2 + \left(-4R^2 + r^2\right)\_c_2}{8\pi r^2 c^2};$

$$Fg1 := \frac{\left(4R^2 b - 2Rbr\right)c^2 + \left(-4R^2 + r^2\right)\_c_2}{8\pi r^2 c^2} \quad \textbf{(18)}$$

> $h := series\left(\frac{\left(4R^2 b - 2Rbr\right)c^2 + \left(-4R^2 + r^2\right)\_c_2}{8\pi r^2 c^2}, r\right);$

$$h := \frac{4R^2 b c^2 - 4\_c_2 R^2}{8\pi c^2} r^{-2} - \frac{1}{4}\frac{Rb}{\pi} r^{-1} + \frac{\_c_2}{8\pi c^2} \quad \textbf{(19)}$$

> $h1 := subs(r = 2\cdot R, h);$

**(20)**

$$h1 := \frac{4\,R^2\,b\,c^2 - 4\,\_c_2\,R^2}{8\,\pi\,c^2}\;2\,R^{-2} - \frac{1}{4}\;\frac{R\,b}{\pi}\;2\,R^{-1} + \frac{\_c_2}{8\,\pi\,c^2} \qquad \textbf{(20)}$$

> #solve$(h = 0, _c_2)$

> $solve\left(\frac{4\,R^2\,b\,c^2 - 4\,\_c_2\,R^2}{8\,\pi\,c^2}\cdot 2\cdot R^{-2} - \frac{1}{4}\;\frac{R\,b}{\pi}\cdot 2\cdot R^{-1} + \frac{\_c_2}{8\,\pi\,c^2} = 0\right)$;

$$\left\{R = R,\, b = b,\, c = c,\, \_c_2 = \frac{4\,b\,c^2}{7}\right\} \qquad \textbf{(21)}$$

> $h := subs\left(\_c_2 = \frac{4\cdot b\cdot c^2}{7}, h\right)$;

$$h := \frac{3\,R^2\,b}{14\,\pi}\;r^{-2} - \frac{1}{4}\;\frac{R\,b}{\pi}\;r^{-1} + \frac{b}{14\,\pi} \qquad \textbf{(22)}$$

> $h := subs(b = 1, h)$;#h dimensionless (adimensional) with $dim(b) = [L^{-2}]$ equal **to** 1 as value;

$$h := \frac{3\,R^2}{14\,\pi}\;r^{-2} - \frac{1}{4}\;\frac{R}{\pi}\;r^{-1} + \frac{1}{14\,\pi} \qquad \textbf{(23)}$$

> $Fg1 := \frac{3\,R^2}{14\,\pi}\;r^{-2} - \frac{1}{4}\;\frac{R}{\pi}\;r^{-1} + \frac{1}{14\,\pi}$ ;

$$Fg1 := \frac{3\,R^2}{14\,\pi\,r^2} - \frac{R}{4\,\pi\,r} + \frac{1}{14\,\pi} \qquad \textbf{(24)}$$

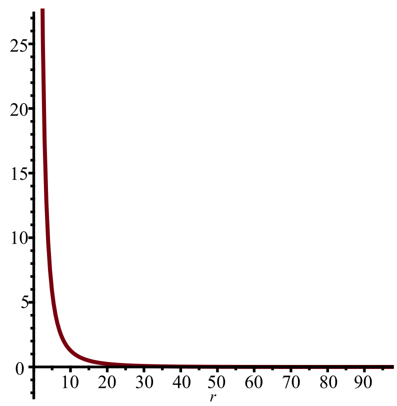
> $Fg := subs(t = 0, c = 3, R = 49, \_c_2 = -4, Fg1)$;

$$Fg := \frac{1029}{2\,\pi\,r^2} - \frac{49}{4\,\pi\,r} + \frac{1}{14\,\pi} \qquad \textbf{(25)}$$

> $Fg := \frac{1029}{2\,\pi\,r^2} - \frac{49}{4\,\pi\,r} + \frac{1}{14\,\pi}$ ;

$$Fg := \frac{1029}{2\,\pi\,r^2} - \frac{49}{4\,\pi\,r} + \frac{1}{14\,\pi} \qquad \textbf{(26)}$$

> $plot(Fg, r = 0..98)$;




> $subs(r = 98, Fg)$; #Verification of the boundery 2R condition (2R=98);

$$0 \qquad \textbf{(27)}$$

> # Calculus of nuclear gravitational forces between 2 nucleons

> restart;#FluxGrav;

> $eq1 := \frac{1}{c^2}\; diff(f(r,t), t, t) - diff(f(r,t), r, r) = 0$;

$$eq1 := \frac{\frac{\partial^2}{\partial t^2} f(r,t)}{c^2} - \frac{\partial^2}{\partial r^2} f(r,t) = 0 \qquad \textbf{(28)}$$

> $iv1 := f(2\cdot R, 0) = 0, D[1](f)(0, 0) = -R\cdot b;$ # *b equal unitary constant of dim* $[L^{-2}]$ **and** *f*(*r*, *t*) *adimensional*;

$$iv1 := f(2R, 0) = 0, D_1(f)(0, 0) = -R\,b \quad \textbf{(29)}$$

> $Sol := pdsolve([eq1, iv1]);$

$$Sol := f(r, t) = \frac{\left(4R^2 b - 2Rbr + \_c_2 t^2 + 2\_C3\,t\right) c^2 + \left(-4R^2 + r^2\right)\_c_2}{2c^2} \quad \textbf{(30)}$$

> $F := \frac{pdsolve([eq1, iv1])}{4\cdot \mathrm{Pi}\cdot r^2};$

$$F := \frac{f(r, t)}{4\pi r^2} = \frac{\left(4R^2 b - 2Rbr + \_c_2 t^2 + 2\_C3\,t\right) c^2 + \left(-4R^2 + r^2\right)\_c_2}{8\pi r^2 c^2} \quad \textbf{(31)}$$

> $Fg := subs(t = 0, F);$

$$Fg := \frac{f(r, 0)}{4\pi r^2} = \frac{\left(4R^2 b - 2Rbr\right) c^2 + \left(-4R^2 + r^2\right)\_c_2}{8\pi r^2 c^2} \quad \textbf{(32)}$$

> $h := series\left(\frac{\left(4R^2 - 2Rr\right) c^2 + \left(-4R^2 + r^2\right)\_c_2}{8\pi r^2 c^2}, r\right);$

$$h := \frac{4R^2c^2 - 4\_c_2 R^2}{8\pi c^2} r^{-2} - \frac{1}{4}\frac{R}{\pi} r^{-1} + \frac{\_c_2}{8\pi c^2} \quad \textbf{(33)}$$

> $subs(r = 2\cdot R, h);$

$$\frac{4R^2c^2 - 4\_c_2 R^2}{8\pi c^2} 2R^{-2} - \frac{1}{4}\frac{R}{\pi} 2R^{-1} + \frac{\_c_2}{8\pi c^2} \quad \textbf{(34)}$$

> $solve\left(\frac{4R^2bc^2 - 4\_c_2 R^2}{8\pi c^2}\cdot 2\cdot R^{-2} - \frac{1}{4}\frac{Rb}{\pi}\cdot 2\cdot R^{-1} + \frac{\_c_2}{8\pi c^2} = 0\right);$

$$\left\{R = R, b = b, c = c, \_c_2 = \frac{4bc^2}{7}\right\} \quad \textbf{(35)}$$

>

> $h := subs\left(\_c_2 = \frac{4\cdot b\cdot c^2}{7}, b = 1, h\right);$

$$h := \frac{3R^2}{14\pi} r^{-2} - \frac{1}{4}\frac{R}{\pi} r^{-1} + \frac{1}{14\pi} \quad \textbf{(36)}$$

> $R := 3.567\cdot 10^{22};$

$$R := 3.567000000 \times 10^{22} \quad \textbf{(37)}$$

> $evalf\left(subs\left(rp = 6371000, R = 3.567\cdot 10^{22}, \frac{3R^2}{14\pi r^2} - \frac{R}{4\pi r} + \frac{1}{14\pi}\right)\right);$

$$\frac{8.678597861 \times 10^{43}}{r^2} - \frac{2.838528410 \times 10^{21}}{r} + 0.02273642044 \quad \textbf{(38)}$$

> $evalf\left(subs\left(r = 6371000, R = 3.567\cdot 10^{22}, \frac{3R^2}{14\pi r^2} - \frac{R}{4\pi r} + \frac{1}{14\pi}\right)\right);$

$$2.138131219 \times 10^{30} \quad \textbf{(39)}$$

> $R := 3.567\cdot 10^{22}; NAv := 6.02214076\cdot 10^{26}; Mp := 5.9722\cdot 10^{24}; Mnut := 1.674027498 \times 10^{-27};$ $Mprot := 1.67262192359\cdot 10^{-27}; Newton := NAv\cdot 0.102; \frac{0.102}{Mnut}; \frac{0.102}{Mprot}; Rp := 6371000; G :=$

$6.6743 \cdot 10^{-11}$; $Nnuc := 19.28 \cdot 8.38 \times 10^{49}$; $\frac{Mp}{Mnut}$; $\frac{Mp}{Mprot}$; $Rsun := 6.963400000 \times 10^{8}$; $Msun :=$ $1.989000000 \times 10^{30}$;

*#Number of nucleons in 102 g and nucleons into Earth;& Clasical Gravitational Force between 2 nucleons approx. Nr. of nucleons in 102 g and Earth at radius rp. # NAv = Avogadro number* $6.02214076 \cdot 10^{26}$

*# Considering the Earth's crust is composed of approximately 47 % oxygen and 28 % silicon (**by** mass), #we can estimate the average number of nucleons per atom as follows:Average nucleons per atom =* $(0.47 \cdot 16 + 0.28 \cdot 28) = 15.56$

*#but approx ~19.28 nuleons per atom counting hevy atoms and* $8.38 \times 10^{49}$ *atoms inside Earth ;*

$$R := 3.567000000 \times 10^{22}$$

$$NAv := 6.022140760 \times 10^{26}$$

$$Mp := 5.972200000 \times 10^{24}$$

$$Mnut := 1.674027498 \times 10^{-27}$$

$$Mprot := 1.672621924 \times 10^{-27}$$

$$Newton := 6.142583575 \times 10^{25}$$

$$6.093089876 \times 10^{25}$$

$$6.098210153 \times 10^{25}$$

$$Rp := 6371000$$

$$G := 6.674300000 \times 10^{-11}$$

$$Nnuc := 1.615664000 \times 10^{51}$$

$$3.567563858 \times 10^{51}$$

$$3.570561831 \times 10^{51}$$

$$Rsun := 6.963400000 \times 10^{8}$$

$$Msun := 1.989000000 \times 10^{30} \quad \textbf{(40)}$$

> $h := evalf\left(\frac{3R^2}{14\pi r^2} - \frac{R}{4\pi r} + \frac{1}{14\pi}\right)$; $h1 := evalf\left(\frac{3R^2}{14\pi r^2}\right)$; $subs(r = Rp, h)$;

*# Thus we approximate with the first term* $\frac{3R^2}{14\pi}$ *because **for** that distance is acurate*

$$h := \frac{8.678597861 \times 10^{43}}{r^2} - \frac{2.838528410 \times 10^{21}}{r} + 0.02273642044$$

$$h1 := \frac{8.678597861 \times 10^{43}}{r^2}$$

$$2.138131219 \times 10^{30} \quad \textbf{(41)}$$

> *# This is the **analitical calculus** below :*

> *# The force between 2 nucleons at radius Earth from atoms on ground level **analitical calculus***

> $h := evalf\left(\frac{3R^2}{14\pi r^2} - \frac{R}{4\pi r} + \frac{1}{14\pi}\right)$;

$$h := \frac{8.678597861 \times 10^{43}}{r^2} - \frac{2.838528410 \times 10^{21}}{r} + 0.02273642044 \quad \textbf{(42)}$$

> $solve\left(\frac{8.678597861 \times 10^{43}}{r^2} \cdot x = \frac{1}{Nnuc \cdot Newton \cdot r^2}\right)$;*# we approximate with the first term for clasic calculus*

$$\{r = r, x = 1.161043022 \times 10^{-121}\} \quad \textbf{(43)}$$

> $x := 1.161043022 \times 10^{-121}$;

$$x := 1.161043022 \times 10^{-121} \quad \textbf{(44)}$$

> $Gfn := x \cdot \left( \frac{3\,R^2}{14\,\pi\,r^2} - \frac{R}{4\,\pi\,r} + \frac{1}{14\,\pi} \right)$; $Nnuc \cdot Newton$; $8.678597861 \times 10^{43} \cdot Nnuc \cdot Newton \cdot x$;

*# the clasical constant is ~1.161043022×10*$^{-121}$

$$Gfn := \frac{1.007622549 \times 10^{-77}}{r^2} - \frac{3.295653603 \times 10^{-100}}{r} + 2.639796229 \times 10^{-123}$$

$$9.924351149 \times 10^{76}$$

$$1.000000000 \quad \textbf{(45)}$$

> $subs\left(r = 4.2 \cdot 10^{-15}, Gfn\right)$;*# Force in Newton between 2 nucleons at 4.2 fm*

$$5.712145969 \times 10^{-49} \quad \textbf{(46)}$$

> $subs\left(r = 2.4 \cdot 10^{-15}, Gfn\right)$; *# Force in Newton between 2 nucleons at 2.4 fm*

$$1.749344703 \times 10^{-48} \quad \textbf{(47)}$$

> $subs(r = 6371000, Gfn)$; *# Force in Newton between 2 nucleons at radius Earth*

$$2.482462333 \times 10^{-91} \quad \textbf{(48)}$$

> $\frac{1.007622549 \times 10^{-77}}{r^2}$;

*# A relatively small distance less than 10*$^{15}$"m" *we approximate the attraction between* 2 *nucleons clasic calculus*;

$$\frac{1.007622549 \times 10^{-77}}{r^2} \quad \textbf{(49)}$$

>