

$$R_0(q): \qquad 0{=}Y\cdot R^3\cdot c^2\cdot (q-1)+Y\cdot R^3\cdot c^2\cdot q+Y\cdot R^3\cdot c^2\cdot \left[\frac{1}{2}\left[q\cdot \left(1-\frac{Y\cdot R^3\cdot q\cdot G}{R_0\cdot c^2}\right)^2-1\right]\right]-Y\cdot R^3\cdot c^2\cdot \left(\frac{1}{\Omega_{bs}}-q\right)$$

$$q(a): \qquad 0{=}M\cdot c^2\cdot (q-1)+M\cdot c^2\cdot q+M\cdot c^2\cdot \left[\frac{1}{2}\left[q\cdot \left(1-\frac{M\cdot q\cdot G}{a\cdot R_0\cdot c^2}\right)^2-1\right]\right]-M\cdot c^2\cdot \left(\frac{1}{\Omega_{bs}}-q\right)$$

$$R_out(q,x): \qquad 0{=}M\cdot c^2\cdot (q-1)+M\cdot c^2\cdot q+M\cdot c^2\cdot \left[\frac{1}{2}\left[q\cdot \left(1-\frac{M\cdot q\cdot G}{R\cdot c^2}\right)^2-1\right]\right]-M\cdot c^2\cdot x \qquad R_out(q(a),x){=}\left[\frac{1}{\left[2\cdot \left(-5\cdot q\cdot c^4+3\cdot c^4+2\cdot c^4\cdot x\right)\right]}\cdot \left(-2\cdot c^2\cdot M\cdot q^2\cdot G+2\cdot \sqrt{-4\cdot c^4\cdot M^2\cdot q^4\cdot G^2+3\cdot M^2\cdot q^3\cdot G^2\cdot c^4+2\cdot M^2\cdot q^3\cdot G^2\cdot c^4\cdot x}\right)\right.\\ \left.\frac{1}{\left[2\cdot \left(-5\cdot q\cdot c^4+3\cdot c^4+2\cdot c^4\cdot x\right)\right]}\cdot \left(-2\cdot c^2\cdot M\cdot q^2\cdot G-2\cdot \sqrt{-4\cdot c^4\cdot M^2\cdot q^4\cdot G^2+3\cdot M^2\cdot q^3\cdot G^2\cdot c^4+2\cdot M^2\cdot q^3\cdot G^2\cdot c^4\cdot x}\right)\right]$$

$$R_{in,0}((2/\Omega.b)-1):$$

$$\sqrt{1-\frac{v^2}{c^2}}{=}\frac{M\cdot \left(\frac{2}{\Omega_{bs}}-1\right)\cdot G}{R\cdot c^2} \qquad x{=}\frac{1}{\Omega_{bs}}-q \qquad 2\cdot (q+x)-1{=}\frac{2}{\Omega_{bs}}-1$$

$$1-\frac{v^2}{c^2}{=}\left[1-\frac{M\cdot \left(\frac{2}{\Omega_{bs}}-1\right)\cdot G}{R\cdot c^2}\right]^2$$

$$1-\frac{v^2}{c^2}{=}\frac{1}{1-4\cdot Y\cdot R^3}\cdot \frac{G}{\left[R\cdot \left(c^2\cdot \Omega_{bs}\right)\right]}+2\cdot \left(Y\cdot R^3\right)\cdot \frac{G}{\left(R\cdot c^2\right)}+4\cdot \left(Y\cdot R^3\right)^2\cdot \frac{G^2}{\left[R^2\cdot \left(c^4\cdot \Omega_{bs}^2\right)\right]}-4\cdot \left(Y\cdot R^3\right)^2\cdot \frac{G^2}{\left[R^2\cdot \left(c^4\cdot \Omega_{bs}\right)\right]}+\left(Y\cdot R^3\right)^2\cdot \frac{G^2}{\left(R^2\cdot c^4\right)}$$

$$q{=}\frac{1}{\sqrt{1-\frac{v^2}{c^2}}} \qquad q{=}\frac{1}{\sqrt{1-4\cdot Y\cdot R^3}\cdot \frac{G}{\left[R\cdot \left(c^2\cdot \Omega_{bs}\right)\right]}+2\cdot \left(Y\cdot R^3\right)\cdot \frac{G}{\left(R\cdot c^2\right)}+4\cdot \left(Y\cdot R^3\right)^2\cdot \frac{G^2}{\left[R^2\cdot \left(c^4\cdot \Omega_{bs}^2\right)\right]}-4\cdot \left(Y\cdot R^3\right)^2\cdot \frac{G^2}{\left[R^2\cdot \left(c^4\cdot \Omega_{bs}\right)\right]}+\left(Y\cdot R^3\right)^2\cdot \frac{G^2}{\left(R^2\cdot c^4\right)}}\\ \left[\frac{1}{\left(-2\cdot Y\cdot G+Y\cdot G\cdot \Omega_{bs}\right)}\cdot c\cdot \sqrt{-Y\cdot G\cdot \left(-2+\Omega_{bs}\right)\cdot \Omega_{bs}\cdot \left(\frac{1}{q}+1\right)}\right.\\ \left.\frac{-1}{\left(-2\cdot Y\cdot G+Y\cdot G\cdot \Omega_{bs}\right)}\cdot c\cdot \sqrt{-Y\cdot G\cdot \left(-2+\Omega_{bs}\right)\cdot \Omega_{bs}\cdot \left(\frac{1}{q}+1\right)}\right.\\ \left.\frac{1}{\left(-2\cdot Y\cdot G+Y\cdot G\cdot \Omega_{bs}\right)}\cdot c\cdot \sqrt{Y\cdot G\cdot \left(-2+\Omega_{bs}\right)\cdot \Omega_{bs}\cdot \left(\frac{1}{q}-1\right)}\right.\\ \left.\frac{-1}{\left(-2\cdot Y\cdot G+Y\cdot G\cdot \Omega_{bs}\right)}\cdot c\cdot \sqrt{Y\cdot G\cdot \left(-2+\Omega_{bs}\right)\cdot \Omega_{bs}\cdot \left(\frac{1}{q}-1\right)}\right]$$

$$R_0_out \text{ aus Hauptgleichung}$$

$$0{=}(2\cdot q-1)+\frac{1}{2}\cdot \left[q\cdot \left(1-\frac{Y\cdot R^2\cdot q\cdot G}{c^2}\right)^2-1\right]-\left(\frac{1}{\Omega_{bs}}-q\right)$$

$$\left[\frac{1}{(Y\cdot (q\cdot G))}\cdot \sqrt{\frac{\left(Y\cdot q^2\cdot G\cdot c^2\cdot \Omega_{bs}+\sqrt{-6\cdot Y^2\cdot q^4\cdot G^2\cdot c^4\cdot \Omega_{bs}^2+3\cdot Y^2\cdot q^3\cdot G^2\cdot \Omega_{bs}^2\cdot c^4+2\cdot Y^2\cdot q^3\cdot G^2\cdot \Omega_{bs}\cdot c^4}\right)}{(q\cdot \Omega_{bs})}}\right.\\ \frac{-1}{(Y\cdot (q\cdot G))}\cdot \sqrt{\frac{\left(Y\cdot q^2\cdot G\cdot c^2\cdot \Omega_{bs}+\sqrt{-6\cdot Y^2\cdot q^4\cdot G^2\cdot c^4\cdot \Omega_{bs}^2+3\cdot Y^2\cdot q^3\cdot G^2\cdot \Omega_{bs}^2\cdot c^4+2\cdot Y^2\cdot q^3\cdot G^2\cdot \Omega_{bs}\cdot c^4}\right)}{(q\cdot \Omega_{bs})}}\\ \frac{1}{(Y\cdot (q\cdot G))}\cdot \sqrt{\frac{\left(Y\cdot q^2\cdot G\cdot c^2\cdot \Omega_{bs}-\sqrt{-6\cdot Y^2\cdot q^4\cdot G^2\cdot c^4\cdot \Omega_{bs}^2+3\cdot Y^2\cdot q^3\cdot G^2\cdot \Omega_{bs}^2\cdot c^4+2\cdot Y^2\cdot q^3\cdot G^2\cdot \Omega_{bs}\cdot c^4}\right)}{(q\cdot \Omega_{bs})}}\\ \left.\frac{-1}{(Y\cdot (q\cdot G))}\cdot \sqrt{\frac{\left(Y\cdot q^2\cdot G\cdot c^2\cdot \Omega_{bs}-\sqrt{-6\cdot Y^2\cdot q^4\cdot G^2\cdot c^4\cdot \Omega_{bs}^2+3\cdot Y^2\cdot q^3\cdot G^2\cdot \Omega_{bs}^2\cdot c^4+2\cdot Y^2\cdot q^3\cdot G^2\cdot \Omega_{bs}\cdot c^4}\right)}{(q\cdot \Omega_{bs})}}\right]$$

$$R_in(2(q+x)-1):$$

$$\sqrt{1-\frac{v^2}{c^2}}{=}\frac{M\cdot (2\cdot (q+x)-1)\cdot G}{R\cdot c^2}$$

$$1-\frac{v^2}{c^2}{=}\left[1-\frac{M\cdot (2\cdot (q+x)-1)\cdot G}{R\cdot c^2}\right]^2$$

$$1-\frac{v^2}{c^2}{=}\frac{1}{1-4\cdot M\cdot \frac{G}{\left(R\cdot c^2\right)}\cdot q-4\cdot M\cdot \frac{G}{\left(R\cdot c^2\right)}\cdot x+2\cdot M\cdot \frac{G}{\left(R\cdot c^2\right)}+4\cdot M^2\cdot \frac{G^2}{\left(R^2\cdot c^4\right)}\cdot q^2+8\cdot M^2\cdot \frac{G^2}{\left(R^2\cdot c^4\right)}\cdot q\cdot x-4\cdot M^2\cdot \frac{G^2}{\left(R^2\cdot c^4\right)}\cdot q+4\cdot M^2\cdot \frac{G^2}{\left(R^2\cdot c^4\right)}\cdot x^2-4\cdot M^2\cdot \frac{G^2}{\left(R^2\cdot c^4\right)}\cdot x+M^2\cdot \frac{G^2}{\left(R^2\cdot c^4\right)}}$$

$$q{=}\frac{1}{\sqrt{1-4\cdot M\cdot \frac{G}{\left(R\cdot c^2\right)}\cdot q-4\cdot M\cdot \frac{G}{\left(R\cdot c^2\right)}\cdot x+2\cdot M\cdot \frac{G}{\left(R\cdot c^2\right)}+4\cdot M^2\cdot \frac{G^2}{\left(R^2\cdot c^4\right)}\cdot q^2+8\cdot M^2\cdot \frac{G^2}{\left(R^2\cdot c^4\right)}\cdot q\cdot x-4\cdot M^2\cdot \frac{G^2}{\left(R^2\cdot c^4\right)}\cdot q+4\cdot M^2\cdot \frac{G^2}{\left(R^2\cdot c^4\right)}\cdot x^2-4\cdot M^2\cdot \frac{G^2}{\left(R^2\cdot c^4\right)}\cdot x+M^2\cdot \frac{G^2}{\left(R^2\cdot c^4\right)}}$$

$$\left[\frac{1}{\left[2\cdot \left(c^4-\frac{1}{q^2}\cdot c^4\right)\right]}\cdot \left(4\cdot M\cdot G\cdot q\cdot c^2+4\cdot M\cdot G\cdot x\cdot c^2+2\cdot M\cdot G\cdot c^2-2\cdot G\cdot M\cdot \frac{c^2}{q}+4\cdot G\cdot M\cdot \frac{c^2}{q}\cdot x\right)\right.\\ \left.\frac{1}{\left[2\cdot \left(c^4-\frac{1}{q^2}\cdot c^4\right)\right]}\cdot \left(4\cdot M\cdot G\cdot q\cdot c^2+4\cdot M\cdot G\cdot x\cdot c^2-6\cdot M\cdot G\cdot c^2+2\cdot G\cdot M\cdot \frac{c^2}{q}-4\cdot G\cdot M\cdot \frac{c^2}{q}\cdot x\right)\right]$$

$$R_out(x) \text{ aus Hauptgleichung:}$$

$$0{=}(2\cdot q-1)+\frac{1}{2}\cdot \left[q\cdot \left(1-\frac{M\cdot q\cdot G}{R\cdot c^2}\right)^2-1\right]-x$$

$$\left[\frac{1}{\left[2\cdot \left(-5\cdot q\cdot c^4+3\cdot c^4+2\cdot x\cdot c^4\right)\right]}\cdot \left(-2\cdot c^2\cdot M\cdot q^2\cdot G+2\cdot \sqrt{-4\cdot c^4\cdot M^2\cdot q^4\cdot G^2+3\cdot M^2\cdot q^3\cdot G^2\cdot c^4+2\cdot M^2\cdot q^3\cdot G^2\cdot x\cdot c^4}\right)\right.\\ \left.\frac{1}{\left[2\cdot \left(-5\cdot q\cdot c^4+3\cdot c^4+2\cdot x\cdot c^4\right)\right]}\cdot \left(-2\cdot c^2\cdot M\cdot q^2\cdot G-2\cdot \sqrt{-4\cdot c^4\cdot M^2\cdot q^4\cdot G^2+3\cdot M^2\cdot q^3\cdot G^2\cdot c^4+2\cdot M^2\cdot q^3\cdot G^2\cdot x\cdot c^4}\right)\right]$$