

15.11

conditions for circular (light) orbits
are with (15.21) & (15.22)

$$\frac{dr}{d\lambda} = 0 \quad \Rightarrow \quad U_{\text{eff}} = \frac{1}{b^2} = \frac{1}{r^2} \left[1 - \left(\frac{a}{b} \right)^2 - \frac{2M}{r} \left(1 - \sigma \frac{a}{b} \right)^2 \right]$$

$$\frac{\partial U_{\text{eff}}}{\partial r} = 0$$

extend $a=M$, co-rotating $\sigma=+1$, $r=M$

insert in equation, check the other.