

Mirror - Effect

If the core of a star collapses, the envelope will expand, and vice versa.

We assume slow contraction, such that the virial theorem still holds, and that the total energy is conserved.

Then:

$$\Omega + 2 E_{kin} = 0$$

$$E_{tot} = \Omega + E_{kin} = const = \frac{1}{2} \Omega$$

\Rightarrow Both E_{kin} and Ω are constant

$$\Rightarrow \frac{d\Omega}{dt} = 0$$

Separate Ω into two terms for the envelope and the core:

$$\Omega = \Omega_c + \Omega_{env} = -\frac{GM_c^2}{R_c} - \frac{GM_c M_{env}}{R}$$

$$\Rightarrow \frac{d\Omega}{dt} = \frac{GM_c^2}{R_c^2} \frac{dR_c}{dt} + \frac{GM_c M_{env}}{R^2} \frac{dR}{dt} = 0$$

$\Rightarrow \frac{dR_c}{dt}$ has the opposite sign of $\frac{dR}{dt}$.

