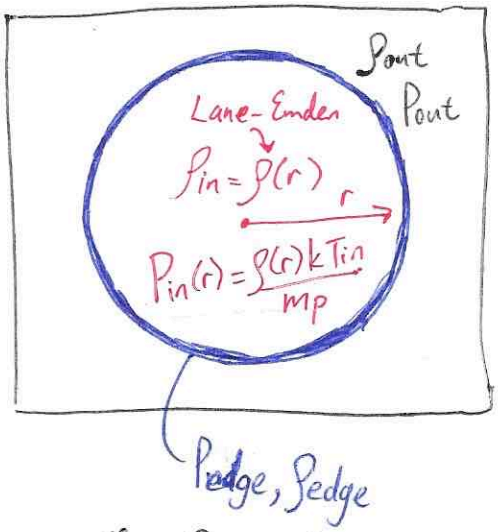

Given $\rho_c = 1.1 \times 10^{-19} \frac{g}{cm^3}$ (Larson)

$T_{in} = 10K$ (observational)

Foster & Chevalier setup:

↳ $P_{edge} = P_{out}$ ①

↳ $C_{s,out} = 1000\, C_{s,in}$ ②

⇒ Find P_{out}, ρ_{out}?

If $P_{out} = P_{edge} \rightarrow$ $\rho_{out} C_{s,out}^2 = \rho_{edge} C_{s,edge}^2 = \rho_{edge} C_{s,in}^2$

$\because P = \rho C_s^2$

$$\rho_{out} (1000)^2 \cancel{C_{s,in}^2} = \rho_{edge} \cancel{C_{s,in}^2}$$

$$\rho_{edge} = 10^6 \rho_{out} \Rightarrow \boxed{\rho_{out} = 10^{-6} \rho_{edge}}$$

If $P_{out} = P_{edge} \rightarrow$ $\frac{\rho_{out} \cancel{k} T_{out}}{\cancel{m_p}} = \frac{\rho_{edge} \cancel{k} T_{edge}}{\cancel{m_p}}$ $T_{edge} = T_{in}$.

ideal gas law

$$\rho_{out} T_{out} = \rho_{edge} T_{in}$$

$$10^{-6} \cancel{\rho_{edge}} T_{out} = \cancel{\rho_{edge}} T_{in}.$$

$$T_{out} = 10^6 T_{in} = 10^6 (10\,K) = 10^7 K$$

$$\boxed{P_{out} = P_{edge} = \frac{\rho_{edge} k T_{in}}{m_p}}$$