

Upper bound on density of Galaxy.

17 Solar mass (maximum mass of any star)  
(0.5 Solar mass)

$$\frac{2 \times 10^{11} \times 17 M_{\text{sun}}}{4\pi \left( \frac{\text{diameter of Galaxy}}{2} \right)^3}$$

$d = 9 \times 10^{17} \text{ km}$  ( $10^5$  years) [about our milky way in size]

$$\frac{34 \times 10^{11} \times 1.99 \times 10^{30} \text{ kg}}{12.56 \times (4.5)^3 \times 10^{51} \times 10^9 \text{ m}^3}$$

milky way has  $(2, 4) \times 10^{11}$  stars.

$$d = 5.9 \times 10^{-24} \text{ g/cc}$$

Density of intergalactic gas,  $\frac{1 \text{ atom}}{\text{m}^3}$ .

$$\sim 1.66 \times 10^{-27} \text{ kg/m}^3$$

$$\sim 1.66 \times 10^{-30} \text{ g/cc}$$