

# task 3.

银河系光度  $\sim 10^{11} L_{\odot}$ ,  $R_e \sim 5 \text{ kpc}$ , Sun:  $M_V = 4.8$

(1) 如果MW距离观测者的距离是100 kpc,  $m_V = ?$ ,  $R_e = ?$ , 平均表面亮度?

(2) 如果MW距离观测者的距离是1 Mpc,  $m_V = ?$ ,  $R_e = ?$ , 平均表面亮度?

$$M_a - M_b = -2.5 \lg \frac{L_a}{L_b}$$

$$M_{\text{MW}} - M_V = -2.5 + 11 \Rightarrow M_{\text{MW}} = -22.7$$

$$\frac{L}{4\pi d^2}$$

$$(1) \quad m - M = 5 \lg d - 5$$

$$m = -22.7 + 5 \lg 100 - 5 = \underline{-17.7}$$

$$\theta = \frac{l}{d} = \frac{5}{100} = \frac{1}{20} \text{ rad} \sim 10^4 \text{ arcsec} \sim \underline{2.86 \text{ deg}}$$

$$\mu = -2.5 \lg \left( \frac{f}{A} \right) + C = m + 2.5 \lg A = \underline{3.54 \text{ mag/arcsec}^2}$$

$$(2) \quad m - M = 5 \lg d - 5, \quad m = -22.7 + 15 - 5 = \underline{-12.7}$$

$$\theta = \frac{l}{d} = \frac{1}{200} \text{ rad} \sim 10^3 \text{ arcsec} \sim \underline{0.28 \text{ deg}}$$

$$\mu = m + 2.5 \lg A = \underline{3.54 \text{ mag/arcsec}^2} \quad (\text{不考虑 cosmic dimming})$$