

PHYSICS 160: Stellar Structure

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Office Hours: Fri. 10-12

Texts: Carrol & Ostlie "An Introduction to Modern Astrophysics",

Homework no. 1

Due: Thurs. Oct. 8

1

The brightest star Sirius has a parallax angle of 0.377 arcsec and a visual apparent magnitude of $m_V = -1.46$

- Find the distance to Sirius in units of (i)pc, (ii)light-years, (iii) Au, and (iv) m.
- What is the absolute visual magnitude of Sirius?
- Compare the luminosity of Sirius in the visual band to the solar luminosity (hint: absolute visual magnitude of the sun $(M_V)_\odot = 4.72$)

2

Equation 3.32 in Carrol and Ostlie defines the quantity C_{bol} :

$$m_{bol} = -2.5 \log_{10} \left(\int_0^\infty F_\lambda d\lambda \right) + C_{bol}$$

Evaluate C_{bol} by using the bolometric magnitude assigned to the sun $m_{bol} = -26.83$

3

Consider a star to be a spherical blackbody with an effective temperature $T_e = 28,000\text{K}$ and radius $R_s = 5.2 \times 10^9\text{m}$. Let the distance to the star $d = 180\text{ pc}$. Find the following:

- Bolometric luminosity of the star
- Absolute bolometric magnitude of the star (hint: use results in problem 2)
- Apparent bolometric magnitude of the star
- Flux at earth's surface
- Peak wavelength of radiation.

Problems 3-8, 3-12, 3-14 in Carrol and Ostlie