Level 2 Stars

David Alexander

Problem Set S.1

(1) Estimate the effective temperature of a star with 10^{-3} times the luminosity of the Sun and a radius equal to that of the Earth. At what wavelength does the emission from the star peak?

[4 marks]

(2) Calculate the temperature where the ratio of electrons in the excited n=2 energy state to the ground state of Hydrogen is 1/100. What other physical process needs to be considered to calculate the strength of the Hydrogen absorption-line features in the optical spectrum of a star?

[6 marks]

[$1eV = 1.602 \times 10^{-19} J$; $k = 1.38 \times 10^{-23} JK^{-1}$; $L_\odot$ = 3.84 x 10^{26} W; radius of Earth = 6.38 x 10^6 m; $\sigma = 5.67 \times 10^{-8} Wm^{-2}K^{-4}$]