PHAS1511 – problem sheet 2   14 January 2010

Please return this, either via e-mail or to my pigeon-hole, by 16 February 2010

1. Draw and label a Hertzsprung-Russell Diagram. What is happening inside stars that are on the *main sequence*? (5)

2. What will happen to a star with a mass of 1 solar mass after it runs out of hydrogen in its core? (5)

3. Give two reasons why collisions between stars are extremely rare. Explain why these two reasons don't apply to galaxies. (4)

4. What observations of a star do we need to measure its motion along the line of sight? What observations do we need to measure its motion in the plane of the sky? (3)

5 a) The star Vega in Lyra has a parallax of 129 milli-arcseconds. What is its distance in parsecs? (1)

   b) If we carefully measure the amount of energy we receive at Earth from Vega, we find that it is 2×10^{-8} W/m². What amount of energy is being emitted by Vega? The solar luminosity is 3.839×10^{26} W – how much more luminous than the Sun is Vega? (4)

   c) If we look at the spectrum of Vega and find that the wavelength of the peak of the emission is at 300nm, what is the temperature of Vega? (1)

   d) What is the radius of Vega in metres? The Sun's radius is 700,000 kilometres – how much larger than the Sun is Vega? (4)

6. Give three pieces of evidence that suggest that the universe began with a Big Bang. (3)