

Practice sheet 1 – solutions will be posted on website a week later

1. At what wavelengths will we observe the following spectral lines:
 - (i) a line emitted at 550 nm by a star moving towards us at 200 km/s?
 - (ii) a CaII line (rest wavelength of 397.0 nm) emitted by a galaxy receding at 30,000 km/s?
 - (iii) A cloud of neutral H emits the 21 cm line while moving away at 100 km/s. At what frequency will we observe this line?
2. What is the energy of a photon of wavelength $\lambda = 600$ nm? Express your answer both in Joule and electronVolt.
3. A hydrogen atom in the second excited state is just barely ionised after a photon strikes it. What is the wavelength of the photon if all its energy is transferred to the atom? In what band of the electromagnetic spectrum does this wavelength fall?
4. How much more energy is emitted by a star at 20,000 K than by one of the same radius at 5000 K? What is the predominant colour of these two stars? Also express your last answer in terms of wavelengths.