# Tarea Unidad 3

Pols → 3.6

The atomic lines for a star are observed to be shifted relative to their normal positions. This is due to a radial velocity of the star (i.e. the component of the star ' s velocity along the line - of - sight). If the shift of the H β line is Δ λ = +0.4 A, what is the value and the direction of the radial velocity of the star?

Calculate the equivalent width of a rectangular line with a 4 -   width and with a flux in its interior that is 2/3 of that of its value in the continuum.

Consider a photosphere composed of pure neutral hydrogen. At what temperature will the density of atoms in the n=2 excited state and in the n=1 ground state are equal (N_2/N_1 = 1)? And for n=3?

Calculate the electronic density ($n_e$) in a gas at T = 14 000 K composed of pure hydrogen where 70 % of the atoms are ionised (assume $U_I$ = 2).

Assume our photosphere has a constant electron pressure of P_e = 2 Pa (2 N/m^2). Use the Saha equation to find the temperature at which the ionized and neutral fractions are equal N_II/N_I = 1.

Consider our photosphere of pure hydrogen again. Combine the Boltzmann and Saha equations to estimate the fraction N_2/N of hydrogen atoms in the n=2 state of H I to the total number density of atoms N = N_I + N_II, for stars with temperatures of T=6000 K (type G0), T = 7200 K (F0), T = 10400 K (A0), and T = 27000 K (B0). Again set P_e = 2 Pa. Compare your estimates to Figure 8-13 of the book. Which spectral type should have the strongest Balmer lines, and why?