ASTR 288C - Astronomy Research Techniques
Fall 2019
Homework Assignment No. 1

1. (a) Consider an ionized nebula of pure hydrogen at a temperature of 8000 K and a density of $n_e = n_H = 200 \ cm^{-3}$. What does the Saha equation give for the $n(H^0)/n(H^+)$ ratio in this gas?

   (b) The typical value for $n(H^0)/n(H^+)$ in an H II region is $10^{-3} - 10^{-4}$. Compare this with the value you obtained above comment on any differences.

2. Consider an H^+ region where the gas is highly ionized. If the temperature is 8000 K and the density is $n_e = n_H = 100 \ cm^{-3}$, what is the rate of recombinations per sec per cubic cm? How long, on average, will an electron wander about until it is captured by a proton?

3. Go to the website http://www.stsci.edu/hst/instrumentation and explore the various Hubble instruments, past and present. Make a table of the Hubble instruments, including

   (a) The name of the instrument.

   (b) The years it was operational.

   (c) The tpye of observations (i.e., images, spectrograph, etc.)

   (d) The wavelength range(s) covered.

   (e) If camera, the field of view & number of pixels.

   (f) If spectrograph, the resolution(s).

   (g) Other capabilities (e.g., polarization).

Due: 16 September 2019