ASTR 288C - Astronomy Research Techniques
Fall 2019
Homework Assignment No. 2

1. In the lecture notes, we gave a relation between the flux in Hβ and the number of H ionizing photons produced by the star:

$$Q(H^0) = 105.3 \; D^2 \; F(H\beta)$$

Following the discussion in the notes, give a full derivation of this relationship, pointing out important approximations you have made.

2. Evaluate $Q(H^0)$ for a blackbody star of radius $5 \; R_\odot$ and T = 20,000K.

   (You will have to evaluate $\mathcal{I}(x_0)$. What are the values of x_0 and $\mathcal{I}$?)

3. Take a look at the following websites:

   http://hla.stsci.edu/hla_welcome.html
   http://archive.stsci.edu/mast.html
   https://astroquery.readthedocs.io/en/latest/mast/mast.html

   The first is the HST Legacy Archive site. It contains Hubble data in a nice format. You can look at images and easily download the data you want.

   The second is a search and retrieval website for MAST: The Mikulski Archive for Space Telescopes. It goes far beyond HST; there are other data up to and including some from TESS.

   The planetary nebula NGC 7027 is a well observed object.

   (a) How many observations of NCG 7027 with HST do you find?
   (b) What other observations of NGC 7027 with other space telescopes do you find in MAST?

Due: 23 September 2019