ASTR 288C - Astronomy Research Techniques
Fall 2019
Homework Assignment No. 7

This was homework assignment no. 5. This time, redo it using **Python** instead of **IDL**.
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1. In class we discussed the idea of creating a mask for an image and how we could implement such a procedure in IDL. Write an IDL procedure that takes an image array "IM" and puts a circular spot of radius "R" and center located at xc,yc on the image, such that the circle contains zeros, while the rest of the image is not affected. Call the returned image "IMX". (Hint: You may find the "where" statment useful.)

2. Go to the Hubble Legacy website

   http://hla.stsci.edu/hlaview.html

   and search for images of the planetary nebula BD+30 3639 (also called PK64+5D1).

   Find the narrow band H-beta image (f487n) taken in 1994

   (proposal 05403 - HARRINGTON): hst_05403_02_wfpc2_f487n_pc_drz.fits

   Download the file and display it using the IDL readfits procedure.

3. Look at the header. Find the inverse sensitivity PHOTFLAM and the filter bandwidth PHOTBW. What is the product of these values? (You will need this number to convert counts to flux in ergs/s.)

4. Isolate a box containing the nebula but not too much sky outside it. Get the total flux in the box in counts. What is the flux in cgs units? (Ground based observations give $F(H\beta) = 9.7 \times 10^{-11}$ erg s^{-1}.)

5. Use the IDL procedure you wrote for the first question to remove the central star from the image. Evaluate the flux without the central star. By what fraction does the flux change?

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Hint: Make use of the distance function "dist.py" in the Python.d directory.

In section 3, instead of PHOTBW, use the filter width W_eff given at the website
http:svo2.cab.inta-csic.estheoryfpsindex.php?mode=browse&gname=HST&gname2=WFPC2-PC

Print out your Python routine and hand it in as part of the assignment.

Due: 4 November 2019