ASTR 288C - Astronomy Research Techniques
Fall 2019
Homework Assignment No. 3

1. In the lecture notes, we gave an expression for the energy loss by collisional excitation of the $1 \Rightarrow 2$ as a function of temperature.

   (a) Show that this loss has a maximum at some T_{max} and derive an expression for T_{max}.

   (b) Consider the O III energy levels. What is the value of T_{max} for the [O III] 5008Å line? For the 88μm line?

2. The planetary nebula NGC 7027 is a well observed object. We have looked at an HST image of this object; it is the file ngc7027.fits in your directory. Look at this image using IDL.

   (a) What is the distance between two pixels of this image in arcseconds?

   (b) You see two circular arcs outside the nebula (and also a faint third one). What is their radius in pixels? In arcsec?

   (c) Find an estimate of the distance to NGC 7027. At that distance, what are the radii of the arcs in cm? In parsecs?

   (d) If they are expanding at 15 km/sec, how long ago did they leave the central star?

Due: 30 September 2019