Stars and Stellar Evolution (WS11-12) Computer Practicum with WTTS

Exercise 1 (18/11/11)

Start Window To The Stars (WTTS) by following the class instructions. Evolve a $1\,\mathrm{M}_\odot$ ($Z = 0.02$) model through the main-sequence phase and toward the giant branch. You will have to "Terminate" the evolution at some point, but you should be able to reach luminosities at least $10\,\mathrm{L}_\odot$ and perhaps more in the time allowed.

Answer the following questions and *save some plots* by right-clicking on plots and using "Save As Postscript" (or, if using the PNG plotting option, "Save As", because "Save As Postscript" will not work):

1.

   a) What are the effective temperature and luminosity of the *starting* model?

   b) What are the maximum temperature and luminosity it eventually reaches?

2. Locate the point in the *HRD* (go to the *HRD* tab) corresponding to the same luminosity as our Sun has now.

   a) What is the approximate age?

   b) What is the effective temperature?

   c) Is this a good model for the Sun?

3. Go to the *Structure* tab.

   a) Which model has the Sun's luminosity? What is its age?

   b) How hot is the centre of the star at age zero?

   c) What temperature does the star reach in the final model?

   d) What is the central temperature in the model most like our Sun?

   e) How long does it take for the star to exhaust its central H supply?

   f) How and why does this affect the central temperature?