Astronomy 241 Problem Set #8

Due 9 April 2024, in Box

Please submit your work in PDF form, for which the filename includes your name(s) and the number of the assignment, e.g. payne_hw1_solo.pdf or baade-zwicky_hw2_team.pdf.

If it's being submitted for a regrade, prepend Regrade_ to the file name.

Solo problems: C&O 14.3, 14.5, 14.12, and T below.

Team problem: C&O 14.13. Team **Jason** is Angel and Waly; Team **Tahani** is Amii and Conor; Team **Chidi** is Ethan and Rafe; Team **Eleanor** is Nora and Annie; Team **Janet** is Joey and Lara; Team **Michael** is Rianna and Avi.

T. Calculate a MESA model for a horizontal branch star typical of what one finds in globular clusters: $M = 0.72 M_\odot$, metallicity Z = 0.0001. Identify the model on the horizontal branch with the aid of the movie output of MESA-Web, using what you know about where the horizontal branch should be in the HR diagram and Kippenhahn diagram, and making sure you have used a high enough output frequency.

   i. From your model, calculate numerically the period Π of the star's fundamental acoustic mode.

   ii. Compare this to an estimate in the manner of class 18, page 5, using a reasonable but uniform value of the specific-heat ratio γ.