

# 4-H-R Diagram

11/9/2023

10 Possible Points

Attempt 1



In Progress

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## Unlimited Attempts Allowed

10/26/2023

### Details


The [Geneva stellar evolutionary tracks](https://www.unige.ch/sciences/astro/evolution/en/research/geneva-grids-stellar-evolution-models/#grids92)  (<https://www.unige.ch/sciences/astro/evolution/en/research/geneva-grids-stellar-evolution-models/#grids92>) provide a model grid of stellar parameters in different stages of a stars evolution.

The different models contain information for

- isochrones (**same age**, different masses) and
- evolutionary tracks (**one mass** over time).

### Getting the Data:

For this assignment, we will use Grids of Stellar Models with Rotation, primarily using solar abundance models ( $Z = 0.014$ ).

You can download the tracks and isochrone grid on [VizieR](http://vizier.u-strasbg.fr/viz-bin/VizieR-3?-source=J/A%2bA/537/A146&-out.max=50&-out.form=HTML%20Table&-out.add=_r&-out.add=_RAJ,_DEJ&-sort=_r&-oc.form=sexa)  ([http://vizier.u-strasbg.fr/viz-bin/VizieR-3?-source=J/A%2bA/537/A146&-out.max=50&-out.form=HTML%20Table&-out.add=\\_r&-out.add=\\_RAJ,\\_DEJ&-sort=\\_r&-oc.form=sexa](http://vizier.u-strasbg.fr/viz-bin/VizieR-3?-source=J/A%2bA/537/A146&-out.max=50&-out.form=HTML%20Table&-out.add=_r&-out.add=_RAJ,_DEJ&-sort=_r&-oc.form=sexa)).

To limit the output, you will need to specify:

- $Z = 0.014$  (and select it)
- Specify rotation models
- For isochrones: enter the age as  $\log(t)$  in years. Example: for a 3 Myr isochrone, enter 6.5
- For evolutionary tracks: enter the initial mass in solar masses
- Output the information in some plain text/ASCII friendly format (e.g. Tab separated, ; separated, ascii text/plain) that will be downloaded. The default is an HTML table

### Assignment:

With this information, I would like you to create **one** H-R diagram with the following:

1. The ZAMS over the mass range provided ( $0.8-120 M_{\text{sun}}$ )
2. Denote where the Sun is located on the H-R diagram
3. Isochrones over a sampling of the available ages (e.g.  $\log(t) = 6.5, 7.5, 8.5, 9.5, 10.1 \text{ yr}$ ), showing how the Main Sequence changes over time.
4. Choose the evolutionary track of one star with  $M < 8 M_{\text{sun}}$  and another with  $M > 8 M_{\text{sun}}$ , plot and label the tracks of these stars. Some accepted values for masses are: 0.8, 0.9, 1, 1.1, 1.25, 1.35, 1.5, 3, 4, 7, 20, 25, 32, 85, 120

[Here is the Jupyter notebook](https://drive.google.com/file/d/1WssGOFcsTnR66wHuPvpj1CHhfeKfyZWP/view?usp=sharing)  (<https://drive.google.com/file/d/1WssGOFcsTnR66wHuPvpj1CHhfeKfyZWP/view?usp=sharing>) to get you started. Make sure to include any references you use in creating this plot (e.g. solar values for



(<https://erau.instructure.com/courses/163207/modules/items/10154082>)

(<https://erau.instructure.com/courses/163207/moc>)

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HR Rubric		
Criteria	Ratings	Pts
ZAMS <a href="#">view longer description</a>		/ 1 pts
Sun <a href="#">view longer description</a>		/ 1 pts
Isochrones <a href="#">view longer description</a>		/ 1 pts
2 evolutionary tracks <a href="#">view longer description</a>		/ 2 pts
Label & Legend <a href="#">view longer description</a>		/ 1 pts
Legibility <a href="#">view longer description</a>		/ 1 pts
Accuracy <a href="#">view longer description</a>		/ 2 pts
Citations <a href="#">view longer description</a>		/ 1 pts
		Total Points: 0

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