

## ExoDMC Instructions

### Important Links:

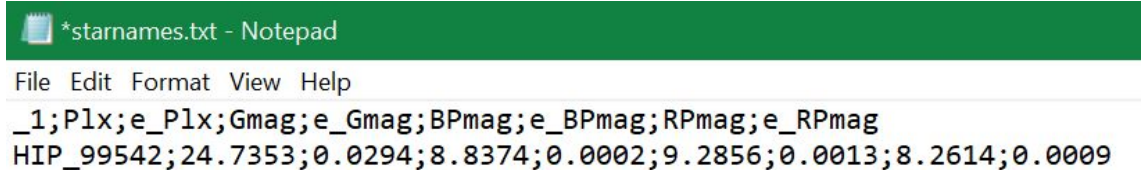
<https://github.com/shinkley/mphys-titanic>

[https://github.com/mbonav/Exo\\_DMC](https://github.com/mbonav/Exo_DMC)

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### Age Code

1. Follow instruction for the Age Code in **mphys-titanic/Common/Age Code/** (<https://github.com/shinkley/mphys-titanic/tree/master/Common/Age%20Code>) (below is a brief summary of instructions):
2. You will need to have '**age\_analysis.py**' and '**MIST\_Gaia\_vvcrit0.4.iso.cmd**' in the same directory
3. Go to the **Gaia DR2** catalogue in **VizieR** ([https://vizier.u-strasbg.fr/viz-bin/VizieR-3?-source=I/345/gaia2&-out.max=50&-out.form=HTML%20Table&-out.add=\\_r&-out.add=\\_RAJ,\\_DEJ&-sort=\\_r&-oc.form=sex](https://vizier.u-strasbg.fr/viz-bin/VizieR-3?-source=I/345/gaia2&-out.max=50&-out.form=HTML%20Table&-out.add=_r&-out.add=_RAJ,_DEJ&-sort=_r&-oc.form=sex))
4. Input your star name into the search bar with a target dimension of 5 arcsec, and check the boxes for **Plx**, **e\_Plx**, **Gmag**, **e\_Gmag**, **BPmag**, **e\_BPmag**, **RPmag**, and **e\_RPmag** and press submit.
5. Create a text file called '**starnames.txt**', with the information formatted like below:



```
*starnames.txt - Notepad
File Edit Format View Help
_1;Plx;e_Plx;Gmag;e_Gmag;BPmag;e_BPmag;RPmag;e_RPmag
HIP_99542;24.7353;0.0294;8.8374;0.0002;9.2856;0.0013;8.2614;0.0009
```

6. Running the **age\_analysis.py** code should then give you the output, **ages.txt**, that contains the star name, age, upper error, and lower error.
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### Mass Sensitivity Code

1. Mass sensitivity code is available in **mphys-titanic/Common/mass\_sensitivity/** ([https://github.com/shinkley/mphys-titanic/tree/master/Common/mass\\_sensitivity](https://github.com/shinkley/mphys-titanic/tree/master/Common/mass_sensitivity))
2. You will need to have '**mass\_sensitivity.py**', '**baraffe\_final.txt**', and the **curve output file** of your star in the same directory.
  - a. The curve output is the text file produced from running the Project Script on your star, and can be the output from LLSG, PCA, annPCA, etc. and should have the name of the star in the file name (e.g. **LLSG\_HIP\_99542\_curve\_outputs**)
3. Check curve\_outputs file for your star and change the variables in **mass\_sensitivity.py** accordingly:
  - a. If it contains **5 columns** of data, **separation\_column=3** and **contrast\_column=0**
  - b. If it contains **7 columns** of data, **separation\_column=4** and **contrast\_column=1**

4. Make a text file called 'star\_names.txt'



```
*star_names.txt - Notepad
File Edit Format View Help
#Tab Seperated
#Name(HIP)      best_Age(My) oldest_Age(My)  youngest_age(My)      Distance(pc)  App. Magnitude
99542  2778    3332    2220    40.7000407  7.087
99542  2778    3332    2220    40.7000407  7.087
```

5. Run **mass\_sensitivity.py**, which should create a folder in your current directory with the sensitivity curve and a data text file called **rad\_mass\_data\_[star name].txt**

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## ExoDMC

1. Download **RunExoDMC.py** and **exodmc.py** from **mphys-titanic/ExoDMC** (<https://github.com/shinkley/mphys-titanic/tree/master/ExoDMC>) (may still need to install the package by typing **pip install ExoDMC** in the console)
2. For transparency, the edits made to the original exodmc.py file created by Mariangela Bonavita are:
  - a. Changed `lxunit='as'` to `lxunit='au'` in `def DImode(self, xlim, ylim, lxunit='as', lyunit='Mjup', verbose=True, plot=True, savefig=True)` on **line 147**
  - b. Changed `plt.rc('text', usetex=True)` to `plt.rc('text', usetex=False)` on **line 189**
  - c. Removed `self.ID[II]+` from `if savefig is True: plt.savefig(self.ID[II]+'_detprob.png', dpi=300)` from **line 208** → you can change the file name for the saved sensitivity map here.
  - d. Changed the plot title on **line 207** to something meaningful.
3. Change **lines 13 and 14** to have the number ID of your star and the distance to the star in pc.
4. Run **RunExoDMC.py**