**Week 3-**

* **Filtering Globular Cluster Stars**

Pick ONE globular cluster to start with. Not all will give you good-looking HR diagrams or obvious clustering in pmra-pmdec space. Start with querying for RUWE < 1.4, no other quality cuts on parallax, pmra, pmdec. Next look for clustering in pmra/pmdec space as like open clusters and do a 3 sigma filter if you are not getting a good HR diagram.

* **Isochrones fitting**

Download the isochrone from the website - [CMD 3.7 input form (inaf.it)](http://stev.oapd.inaf.it/cgi-bin/cmd)

Only change the age and metallicity at the end, and change the passbands to Gaia EDR3 - G, BP, RP in the middle

Refer recording for help with this section.

Look up the Wikipedia articles on initial mass function and stellar isochrones.

Convert all data into a CSV file and import the data into your notebook. Then try to fit the isochrones horizontally. For vertically fitting it you need to add some constant along the y axis.

* **Finding Distance**

Now find the absolute magnitude of the horizontal branch. Apparent magnitude is there in your HR diagram - if it’s missing use the red clump to be one magnitude brighter than the HB.

Query for a theoretical isochrone of 12 billion years, -0.6 or -0.9 metallicity to start with. Shift it down to go from absolute to apparent, keep tweaking slightly until you get an overlap on the HB/red clump. Remember you’re not fitting the *whole* isochrone - just a small part of it!

Once you have a good overlap, translate the difference between app and abs mag to distance to cluster using the magnitude formula.

* **Report-** Start filling this ASAP: <https://www.overleaf.com/project/6585a03d1e06672beb908836>

Some of the parts of Introduction are already filled to help you understand how to write the report further.

**Week 4-**

**Finding Age and Metallicity**

Download isochrones from last week’s website for a range this time - 10 to 13.5 billion years in steps of 0.5, and 0 to -1.5 metallicity in steps of 0.3. You’ll have 48 isochrones. Take them in groups of 6 or 8 each and VISUALLY pick the best fit in each group.

You should ideally see the same age or same metallicity giving the best fit in each ‘group’. Once you have the best member of each group, take these and overlay again to get the final best fit. The process: from 48, pick 6 or 8, i.e. one of each group. From these 6 or 8, pick the best 1. This gives you your best estimate for the globular cluster’s age and metallicity!