

There two similar pipelines for **CFHT** and **Fourier_Quad**.

1 Distance

Firstly, the distance should be calculated. “**calculate_co-distance.py**” calculates the comoving distance (Mpc/h) and the integrate part in the distance calculate for the final GGL calculation. The parameters should be specified in code. The data will be saved in a hdf5 file. The distances will be signed to the source catalog in “**prepare_background_cata.py**”.

“/OM0_H0_C” contains a array of Ω_{m0} , H_0 , and $C_0(\sim 2.9)$.

“/Z” contains the redshifts ($0 \sim Z_{max}$).

“/DISTANCE” contains the distances (Mpc/h).

“/DISTANCE_INTEG” the integrate part of the distance.

2 CFHT catalog

2.1 Prepare data

1. “**add_ODD_Z_B.py**” adds **Z_MIN**, **Z_MAX**, and **ODDS** (from the .csv files) to the **CFHT** catalog for source selection. It will create two new files (.hdf5 & _new.dat) that contains the added parameters.

The hdf5 file contains 3 arrays:

“/data”: the catalog with the 3 added parameters. The column: “*RA DEC Flag FLUX_RADIUS e1 e2 weight fitclass SNratio MASK Z_B m c2 LP_Mi star_flag MAG_i Z_B_MIN Z_B_MAX ODDS*”. The last three are added.

“/mask”: it should be 1 for each source

“/dRA_dDEC”: delta RA and delta DEC, they should be very small for each source ($< 10^{-5}$)

2. Run “**prepare_background_cata.py**” in “collect” mode with MPI to stack the data from each field. It creates the “**cfht_cata.hdf5**” in the parent directory of the one contain the field catalog. The data in i -th area will be in “/w_i” in the .hdf5 file. **If the catalog file (cfht_cata.hdf5) doesn’t exist, run it firstly!** Before this step, **CFHT** catalog contains 19 ($0 \sim 18$) columns. After this the 19’t & 20’t column are the PZ data from Dong FY.

3. Run “**prepare_background_cata.py**” in “select” mode with CPU’s as the same number as the area. The result will be in **cfht_cata_cut.hdf5**. The cutoff should be specified in the code. The program will create a few additional data for GGL calculation (see the code). At the end, the first thread will call “add_com_dist (add_com_dist.cpp)” to sign distance to the source.