Hubbule parameter:

$$
\begin{aligned}
H^2 &= H_0^2[\frac{\Omega_r}{a^4}+\frac{\Omega_m}{a^3}-\frac{Kc^2}{a^2H_0^2}+\Omega_\Lambda] \\
&= H_0^2[\frac{\Omega_r}{a^4}+\frac{\Omega_m}{a^3}+\frac{1-\Omega_0}{a^2}+\Omega_\Lambda]
\end{aligned}
$$

Comving distance:

$$
dt=\frac{da}{\dot{a}} \Rightarrow -dw=\frac{cdt}{a}=\frac{cda}{a\dot{a}}=\frac{cda}{a^2H}
$$

$$
\begin{aligned}
w(z_1,z_2) &= \frac{c}{H_0}\int_{a(z_2)}^{a(z_1)}\frac{da}{\sqrt{a\Omega_m+a^2(1-\Omega_m-\Omega_\Lambda)+a^4\Omega_\Lambda}}, z_1<z_2 \\
&= \frac{c}{H_0}\int_{z_1}^{z_2}\frac{dz}{\sqrt{(1+z)^3\Omega_m+(1+z)^2(1-\Omega_m-\Omega_\Lambda)+\Omega_\Lambda}}, z_1<z_2 \\
&= \frac{c}{H_0}\alpha(z_1,z_2)
\end{aligned}
$$

The search radius is $Rh^{-1}Mpc$. Then, the search radius in arcmin is

$$
\begin{aligned}
&w\theta=\frac{c}{H_0}\theta\alpha(z_1,z_2)=\frac{c\times10^5Km\cdot s^{-1}}{100hKm\cdot s^{-1}Mpc^{-1}}\theta\alpha(z_1,z_2)=Rh^{-1}Mpc \\
&\Rightarrow\theta=\frac{R}{1000c\alpha(z_1,z_2)}\frac{180\times60}{\pi}=\frac{10.8R}{c\pi\alpha(z_1,z_2)}
\end{aligned}
$$

The $\alpha(z_1,z_2)$

Process

1). Run Prepare_data.py collect data from each field. The data will be selected by some cutoffs. The name of the result file is "cata_result_ext.hdf5".

"mpirun -np .... prepare_data.py collect"

2). Run the sym_mc_plot_cfht.py for cutoffs. Then determine the cutoff threshold (flux_alt or ..) according to the results (multiplicative bias and additive bias).

3). Run prepare_data.py to select the data needed. The name of the result file is "cata_result_ext_cut.hdf5".

"mpirun -np .... prepare_data.py select"

4). Run the C++ program to build the grid and assign the source to each grid for final calculation.

"mpirun -n .... "