How to get efficiency distribution

I.- Create a histogram of true energy using the species that you want and their weight

II.- Each bin is divided by **detangle** & **width of that energy bin** & **area**

$2\pi(cos0 - cos45^{o})$

3,141,592.65 m^2

How to get response matrix

I.- Create a 2D histogram of true energy and reconstructed energy

II.- Each bin is divided by **detangle** & **width of that energy bin** & **area**

How to normalized the efficiency and R-matrix when IWgt is used

I.- Create a flux distribution using a model (for example CREAM2)

II .- FLUX

* The efficiency is divided by the flux.

III.- Response Matrix

* Each row of the R-matrix (reconstructed energy) is divided by the flux.
* R-matrix is normalized in direction of true distribution.
* Each columns (true distribution) is multiplied by efficiency distribution

Is OneWgt normalized?

Isotropic weight (IWgt): $$w(E,r) = \frac{1}{\tau(E,r)}\Phi(E)$$

$$\tau(E,r) = \frac{N_{thrown}}{2\pi(R_f - R_i)(\frac{1}{E_i} - \frac{1}{E_f})\pi(cos_2\theta_i) - cos^2\theta_f}\frac{E^-2}{r}$$

Consider:

- Isotropic differential flux
- The weight depends on the type of species due to the flux is different for each one

One weight (OneWgt): $$w(E,r) = \frac{1}{\tau(E,r)}$$

The equation for OneWgt is the same than IWgt but without target flux that could be considered like it is normalized due to it was divided by a flux (similar to how to normalize when IWgt is used).

Then if we use it for Crab we should take an small area due to this equation is consider for isotropic flux. We use a circule with 0.5 of radius from the Crab position.

How to use TWgt

$$\tau(E,r) = \frac{N_{thrown}}{2\pi(R_f - R_i)(\frac{1}{E_i} - \frac{1}{E_f})\pi(cos_2\theta_i) - cos^2\theta_f} \frac{E^-2}{r}$$

$$w(E,r,\theta) = \frac{1}{\pi} \frac{\Phi(E)}{\tau(E,r)} \frac{dt}{dcos\theta}$$

An idea of why the efficiency have a rare counts (~10^2 instead of ~10^-2)

First the equation is different that Isotropic one. It is due to the TWgt is a function of theta.

Now I am normalized like OneWgt, maybe I should add this part but I don't know how to do it

$$\frac{1}{\pi} \frac{dt}{dcos\theta}$$