Flowchart for halo upper limit estimation

FILES : upper_limit.py, params.py, modules.py
TO RUN : casa -> execfile('upper_limit.py')
PREREQUISITES: astropy, numpy, BANE, astroquery (optional)
INPUT : Image file + last MS file used to create the image file
OUTPUT : MS file with halo visibilities + image file with halo + conv. image

RMS Estimation

- The software BANE is used to estimate the RMS in the image
- The RMS is used to estimate the threshold for cleaning and also the flux of the halo to be added
- Region can be defined in params.py

Creating Halo Image

- Halo image is assumed to be at effective frequency of image
- Specific parameters of halo can be selected in params.py (position, size, Total flux, profile)
- Redshift of cluster used to estimate angular size of halo This can be provided either manually or by giving source name
- Halo flux is given as a factor of estimated RMS

Add halo To visibility file

- The halo needs to be scaled to all frequencies of the visibility before adding to MS file
- Frequency information estimated from MS file
- Scaling done using standard relation (S=kv^-a)
- The task ft is used to convert halo images to visibilities
- Visibilities added on a channel by channel basis
- New MS file created with original data, model column with halo visibilities and corrected column which is the sum of the two

Cleaning

- Cleaning done via tclean or msclean (currently tclean)
- Parameters can be given in params.py
- Cleaning threshold is chosen using estimated RMS

Convolution & Statistics

- Image produced is convolved to a poorer resolution to bring out extended emission better
- Convolution parameters given in params.py. A fixed beam size or a factor times original beam can be chosen
- Statistics estimated in given region to estimate excess flux between new and old images