KRITTIKA
SUMMER
PROJECTS

Exploring the Radio Sky
Week 5b

Summer 2023

1   Note on `CASA` **tasks** `imfit` **and** `imstat`

In the last meeting on Wednesday, we were having a discussion on the `CASA` tasks `imfit` and `imstat`. I wish to clarify here some points that I didn't convey properly in the meeting.

- `imstat` gives you statistics in the image cell (cell-size is smaller than the resolution of the array). It can be used to calculate both flux density of a point source and integrated flux density of an extended source. Please follow the activity below that will tell you have to get use this task to obtain the flux density of an extended source.

- `imfit` fits a gaussian on your image. This is only useful if you have a point source or an extended source that has a gaussian like shape. Look at the output of `imfit` to check if the source is a point source or an extended source. The value of the integrated flux density can be used to quote the flux densities for both of them. For sources with more structure, please follow the activity below. `imfit` will not give correct results for that.

The peak flux densities reported by `imfit` and `imstat` may vary slightly as they are calculated differently. That does not matter as long as the flux density is calculated in the correct region. For information on `imfit` and `imstat`, please refer to https://casadocs.readthedocs.io/en/latest/notebooks/image_analysis.html.

2   Activities

2.1   Imaging supernova remnant 3C 391

Having seen the basic steps of imaging in our last activity, we can apply that to image the beautiful supernova remnant 3C 391. The `CASA` tutorial linked here has the calibration process also. We have already finished the calibration process for you and uploaded the calibrated data for the main target in the Google drive under `Week_5/3c391_ctm_mosaic_spw0.ms.tar.xz`.

Tasks:

- Download the calibrated data and follow the instructions in the imaging section of the above linked tutorial to image the supernova remnant.

- Once imaged, calculate the integrated flux density using `imstat` as instructed in image analysis section.