# Appendix A

# PyMORESANE: Instructions

The following appendix serves as a very brief introduction to the use of PyMORESANE. Whilst it may seem that there are many parameters, most of them are related to optimisation, and very few of them will need to be changed for normal usage. Note, the PyMORESANE help command will present all these options in the terminal.

Following installation, and assuming that PyMORESANE has been aliased as runsane, the standard input is as follows:

**runsane dirty psf outputname**

These are the non-optional parameters which are specified by position - order matters. The first positional argument, **dirty**, should be the name and address of the dirty .fits image in question. The second, **psf**, is the same as dirty but for the PSF associated with the dirty image. The final positional argument, **outputname**, is a string on which the names of the output will be based.

There are many optional arguments, all of which can be exposed with the **runsane --help** command. The most important optional parameters are as follows, and take the format of **--argumentname ARGUMENTVALUE**:

| Argument | Long Argument | Functionality |
|---|---|---|
| -ep | --enforcepositivity | Forces output model to be positive. Yields a smoother, more realistic model at the expense of computation time. Note, this is boolean and does not accept a value. |
| -sbr | --subregion | Selects the central N-by-N pixels to deconvolve. Restrict this to powers of 2 for optimal functionality. |
| -sl | --sigmalevel | Specifies how close to the estimated noise the algorithm will deconvolve. This is a multiplier with a default value of 4 - deconvolves to 4 sigma. |
| -lg | --loopgain | The gain factor analogous to that of CLEAN. |
| -tol | --tolerance | The tolerance factor for object extration. May usually be left as the default. |

The arguments explained thus far may all alter the results and are also the only paramters which may be tuned. The remaining paramters, omitted here, but documented in the help function, are pricipally flags for enhanced operation modes. These include enabling and disabling GPU functionality, changing the way in which convolution is performed, and incorporating edge suppression.

A basic test problem would be to take an image of size $(1024, 1024)$, along with its PSF, and run the following command:

**runsane dirty.fits psf.fits test_output --enforcepositivity**

This command will work in most cases without any further input or tuning and concludes these basic instructions. For more advanced functionality, refer to the help functions or the code at (https://github.com/ratt-ru/PyMORESANE).