**Creation of Master Flat**

The creation of the master flat takes place within the procedure ADDFLAT.PRO

The value of the variable flatnorm in the CTIO.PAR file defines the steps taken for the creation of the master flat.

|  |  |
| --- | --- |
| 0 | The master flat was NOT normalized before being calculated. Spectra are not flattened. |
| 1 | The master flat was NOT normalized before being calculated. Spectra are flattened AFTER extraction. |
| 2 | The master flat was NOT normalized before being calculated. Spectra are flattened BEFORE extraction. By default, order extraction is reduced by 4 pixels for the slicer mode. |
| 3 | The master flat WAS normalized before being calculated. Spectra are flattened AFTER extraction. |
| 4 | The master flat WAS normalized before being calculated. Spectra are flattened BEFORE extraction. By default, order extraction is reduced by 4 pixels for the slicer mode. |

Every flat image is read and stored in a cube variable (The cube variable is analogous to a stack of images). If the flat according to the options above is said to be normalized, then every flat image in the stack is normalized by dividing it to its maximum value. The maximum value of each image is found by creating a swath of 100 pixels in the center and in the cross-dispersion direction, finding the median for each row of pixels in the dispersion direction and determining the maximum value out of the median-found pixels. The same mean of all maximum values found for each image is multiplied to each image , so each image within the stack more less gets back to its original intensity before producing the master flat.

Either the mean or the median (depending on the variable master\_flat in the CTIO.PAR file) of the flat frames saved in a cube variable is found such that the equivalent of a master flat frame is produced and stored in disk as chiYYMMDD.mode.sum

All pixels, if any, with the value zero or less are flagged as bad pixels by setting its value to 1.

If the Option 1 is picked, then there is no extraction of the master flat. If options 1 or 3 then then the master flat is extracted in the procedure ‘getflat.pro’ and a variable in cube form stores the extracted spectrum from master flat where [\*,\*,0] : Flat Spectrum /Smoothed

[\*,\*,1] : Flat Spectrum

[\*,\*,2] : Smoothed Flat Spectrum

And stored as chiYYMMDD.modeflat.fits. Note, three versions of the flat spectrum are created but only one is used. The stellar(s) or master stellar is extracted and then divided by the flat within ctio\_spec.pro.

If options 2 or 4 then the master stellar frame gets divided by the stellar(s) or master stellar

Before extraction within ctio\_spec.pro.

* Note the Master Flat is used for order tracing.