omgrism

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Abstract

Extracts source spectra from OM Grism OSW image FITS files.

1 Instruments/Modes

Instrument	Mode
OM	IMAGING

2 Use

pipeline processing	yes
interactive analysis	yes

3 Description

This task constructs the PPS product, grism spectra, extracted from an Optical Monitor image obtained with one of the OM grism-filters. The image is previously undistorted by **omgprep** and rotated in order to align the spectra with the image columns. The task makes use of a source-list produced by running **omdetect** on the same image. The output file contains tables with background subtracted spectrum rates & corresponding errors, background rates & error, spectrum flux & error. All rates are in $counts/s/$Å, and the fluxes are in $ergs/s/cm^2/$Å.

4 Parameters

This section documents the parameters recognized by this task (if any).

Parameter	Mand	Type	Default	Constraints
set	yes	string		

OM image file with grism spectra aligned with respect to the columns of the image (output from *omgprep*).

sourcelistset	yes	string		

Source list (output from OMDETECT)

outset	yes	string		

Output spectra file

regionfile	no	string		

Name of the ASCII (input) region file

spectraregionfile	no	string		

Name of the ASCII (output) spectra region file

outspectralistset	no	string		

Output file containing the extracted spectra list (in a brief form)

extractfieldspectra	no	logical	false	

If set to *true* switches the task into the mode for extraction of all available spectra in the field

spectrumhalfwidth	no	real	-8.	-20 to 20

Halfwidth of the spectrum extraction region; expressed in pixel, if negative, or in FWHWs, if positive

bkgoffsetleft	no	real	0.	-20 to 20

Offset of the left background extraction region (from the left edge of the spectrum extraction region); in pixels, if negative, or in FWHWs otherwise.

bkgwidthleft	no	real	-8.	-40 to 40

Width of the left background extraction region; in pixels, if negative, or in FWHWs otherwise.

bkgoffsetright	no	real	0.	-20 to 20

Offset for the right background extraction region (from the right edge of the spectrum extraction region); in pixels, if negative, and in FWHWs otherwise.

bkgwidthright	no	real	-8.	-40 to 40

Width of the right background extraction region; in pixels, if negative, or in FWHWs otherwise.

spectrumsmoothlength	no	integer	0	≥ 0

Length of the smoothing window for smoothing the output spectra (if smoothing is desirable); the parameter set to 0 or 1 implies no smoothing.

extractionmode	no	integer	0	extractionmode ≥ 0

Switch between different extraction modes. The value 0 corresponds to the normal extraction (summation of counts in the cross-dispersion direction); 1 corresponds to the Optimal Extraction (Horne's algorithm); 2 corresponds to the one-dimensional spline smoothing (in the cross-dispersion direction); 3 corresponds to the one-dimensional Gaussian fit (in the cross-dispersion direction).

5 Errors

This section documents warnings and errors generated by this task (if any). Note that warnings and errors can also be generated in the SAS infrastructure libraries, in which case they would not be documented here. Refer to the index of all errors and warnings available in the HTML version of the SAS documentation.

The spectrum is badly affected by Mod-8 noise / coincidence loss *(warning)*

corrective action: Issue a warning.

Could not find any compatible blocks in set *(warning)*

corrective action: The input source list file is empty (probably no sources were detected by *omdetect*. Issue a warning. No spectra will be extracted

6 Input Files

1. OM grism, rotated image file (output from OMGPREP)
2. OM source list file (output from OMDETECT)

7 Output Files

1. PPS product OM OSW FITS spectra
2. FITS file containing the list of all the extracted spectra (by request, using the *outspectralist* parameter
3. ASCII file containing the extracted spectra regions

8 Algorithm

```
   subroutine omgrism

     read parameters

     get handle on source rates file

     check if this file contains data

     get handle on the input image file

     check if the image file corersponds to the Grism-1 or Grism-2 filters

     set the grism-state for the CAL routines

     get CAL plate scale

     get the number of sources detected by omdetect

     allocate indicators for source shapes and source relations

     loop source=0, nSources

       determine the source shape and classify each source
       according to the filter-dependents specific criteria

     end loop

     loop source=0, nSources

       if source is extended (first-order)

 loop iSource=0, nSources

    check if the extended source  corresponds to a
            point-like source (zero-order) by the criteria
            corresponding to the given Grism filter
            and mark the zero- and first-order sources as
            related to each other

         end loop

       end if

     end loop

     loop source=0, nSource

if source is marked as having a corresponding zero-order
        within the image then extract the spectrum and add
        the corresponding data table to the output FITS-file

     end loop
```

```
    write spectra keywords to header

    write output spectrum file

    release handles

  end subroutine omgrism
```

9 Comments

The optimal extraction algorithm for spectra extraction is under development.

10 Future developments

- Spectra extraction algorithms to be improved
- Coincidence-loss correction to be applied

References