

## PROGRAM: Cyclops2cyl

Author: J. Rodriguez-Carvajal (ILL)

Created: 30 July 2012, Updated: April 2015, October 2015

This program treats the raw TIFF images of CYCLOPS and converts them to the binary form of the **Esmeralda** program. The extension of the modified images is `.hbin`. The program converts the octagonal geometry of CYCLOPS to a cylindrical geometry similar to those of VIVALDI/LADI/KOALA. The mathematical description of the applied corrections can be consulted in the document **Cyclops\_to\_cylindrical.pdf** accessible from **Esmeralda** menu and stored in the **Esmeralda\_Laue\_Suite (Docs)** directory.

The use of the program from a console terminal is as follows:

```
Prompt> cyclops2cyl  buffer_file <cr>
```

The `buffer_file` is the name of a text file in which the user has gathered the instructions to the **Cyclops2cyl** program.

The buffer file should contain keywords (in bold) with values that are as follows:

```
INSTRM   My_cyclops_instrm.inf   My_New_instrm.inf
CYL_DIM  nrow_cyl  ncol_cyl  radius_cyl  height_cyl
TRANSF  flip_h  flip_v  noise kernel-size  threshold
ALPHAS   my_alpha_file_name    alpha_offset
BACKGROUND my_background_file_name
HBIN_DIRECTORY my_hbin_directory
IMAGES   average  normalize norm_time  offset offset_value
Image_file1
Image_file2
.....
Image_filen
```

The meaning of the items is the following:

### **INSTRM**

`My_cyclops_instrm.inf`      Name of the instrument file corresponding to Cyclops octagonal geometry

`My_New_instrm.inf`          Name of the instrument file corresponding to the cylindrical geometry to be used with the transformed images

### **CYL\_DIM**

`nrow_cyl, ncol_cyl`          Number of horizontal and vertical pixels of the final cylindrical image.

`radius_cyl, height_cyl`      Radius (mm) and height (mm) of the final cylindrical. detector. Should be close to that of the original image.

### **TRANSF**

`flip_h, flip_v`              These are keywords that, if present, a horizontal or/and vertical flipping is applied.

**noise** If present, a noise correction is applied with the numerical values `kernel-size` and `threshold`. A previous offset can be applied to the read image if the keyword **offset** is also given in the line with **IMAGES** keyword together with its value (see below, but this is no more needed!)

`kernel-size,threshold` Numerical parameters for the noise correction, typically `kernel-size=5` (in pixels) and `threshold=50` (in % of the local median)

**ALPHAS**

`my_alpha_file_name` Name of the file containing the efficiency corrections. If the numeric value `alpha_offset` is provided. The correction is applied as:  

$$\text{CorrImage} = \text{NINT}((\text{RawImage} - \text{Offset}) * \text{Alphas})$$

**BACKGROUND**

`my_background_file_name` Name of the file containing the background to be removed from each image before applying the geometrical corrections.

**HBIN\_DIRECTORY**

`my_hbin_directory` Directory in which all the output `.hbin` images will be stored. In the directory does not exist it will be created.

**IMAGES**

**average** If this keyword appears in the **IMAGES** line an average of consecutive images is performed. The averaging is performed on images having a common root name of the form `CommonName_001.tif`, `CommonName_002.tif`, ... `CommonName_00n.tif`

**sum\_trunc** If this keyword appears in the **IMAGES** line an sum of consecutive images is performed. The sum is performed on images having a common root name of the form `CommonName_001.tif`, `CommonName_002.tif`, ... `CommonName_00n.tif`. The points with intensity higher than 65535 are fixed to that value. This keyword should not be used when **normalize** is given.

**raw** The output format of the images is `.raw`, the image is written contiguously by column major order in 16 bits

**normalize** `norm_time` All the images are normalized to a same time fixed by the value `norm_time`.

**offset** `offset_value` An offset of value `offset_value` is applied to the read images before applying the transformation to cylindrical geometry (this is no more needed, or `offset_value=0`)

`Image_filei` Are the full names of the TIFF files in which the images to be transformed are stored (may contain the complete path).

In the case the user wants to include extra information in binary files with *visible* headers, some items can be given following the image file names, after the separator ":" in order to construct a header. The interpretable items are: *Title, user, temp, magn, press, omeg, xdis, ydis, zdis*

*Title* and *user* are followed by alphanumeric information and all the others are followed by numeric values. The items are separated by ":".

The above list of image file names is transformed for a particular case, for instance, as in the following example in which the size of the cylindrical image is half of the original image (2400 x 7680):

```
INSTRM      cyclops_octagone.inf  cyclops_cylinder.inf
!      nrow_cyl  ncol_cyl  radius_cyl  height_cyl
CYL_DIM    1200          3840          200.38      415.00
TRANSF    flip_h flip_v noise 5 50
ALPHAS    alpha.dat      100
BACKGROUND
IMAGES    normalize      800
Image_file1 :: title my_title : temp 300 : omeg 34.12 : magn 3.5 : press 0
Image_file2 :: title my_title : temp 300 : omeg 54.12 : magn 3.5 : press 0
.....
Image_filen :: title my_title : temp 300 : omeg 174.1 : magn 3.5 : press 0
```

The current settings of Cyclops (November 2014) and the particular way of reading the image makes that there is no need to include the flip instructions: **flip\_h**, **flip\_v**.