

# Mask Editor for LCLS-II

Mask Editor GUI is intended to manually create/edit mask of bad pixels and save it as 2-d image and 3-d array shaped as data.

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## Launch Mask Editor

Mask Editor GUI can be launched in lcls2 software release (>ps-4.6.0) by command

```
masked
```

with(out) optional parameters as explained in help

```
masked -h
```

## masked -h command dump on 2023-10-01

```
ps-4.6.0 [dubrovin@sdflogin002:~/LCLS/con-lcls2/lcls2]$ masked -h
usage: Usage:
  masked -a <fname-nda.npy> -k <DataSource-kwargs> -d <detector> -g <fname-geometry.txt> [-L <logging-mode>]
[...]

Help:
  masked -h

Examples:
  masked # set all parameters using GUI
  masked -d epix10ka_000001 # takes geometry from detector DB
  masked -d epix10ka_000001 -k exp=ueddaq02,run=569 # takes geometry from experiment DB
  masked -g /sdf/group/lcls/ds/ana/detector/data2_test/geometry/geo-epix10kaquad-tstx00117.data # takes
geometry from file
  masked -a /sdf/group/lcls/ds/ana/detector/data2_test/misc/epix10kaquad-meclv2518-0101-CeO2-ave.npy # takes
array for image from file
  masked -a /sdf/group/lcls/ds/ana/detector/data2_test/misc/epix10kaquad-meclv2518-0101-CeO2-ave.npy -g /sdf
/group/lcls/ds/ana/detector/data2_test/geometry/geo-epix10kaquad-tstx00117.data
  masked -d epix10ka_000001 -a /sdf/group/lcls/ds/ana/detector/data2_test/misc/epix10kaquad-meclv2518-0101-CeO2-
ave.npy
  masked -d epix10ka_000001 -k exp=ueddaq02,run=569 -a /sdf/group/lcls/ds/ana/detector/data2_test/misc
/epix10kaquad-meclv2518-0101-CeO2-ave.npy

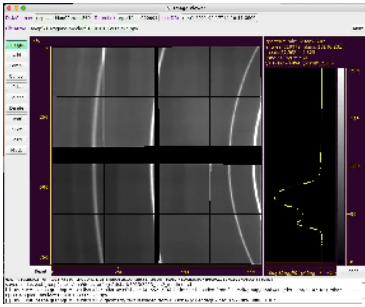
masked - command opens mask editor GUI

positional arguments:
  posargs          list of positional arguments: [<fname-nda.npy>] [<fname-geometry.txt>], default = []

optional arguments:
  -h, --help          show this help message and exit
  -a NDAFNAME, --ndafname NDAFNAME
                      image array file name*.nda, default = Select
  -d DETNAME, --detname DETNAME
                      detector name, default = Select
  -k DSKWARGS, --dskwargs DSKWARGS
                      string of comma-separated (no spaces) simple parameters for DataSource(**kwargs), ex:
exp=<expname>,run=<runs>,dir=<xtc-dir>, ..., or <fname.xtc> or
                      files=<fname.xtc> or pythonic dict of generic kwargs, e.g.: '{"exp':'tmoc00318', 'run':
[10,11,12], 'dir':'/a/b/c/xtc'}", default = Select
  -g GEOFNAME, --geofname GEOFNAME
                      geometry description constants file name *.txt, *.data, default = Select
  -L LOGMODE, --logmode LOGMODE
                      logging mode, one of CRITICAL, FATAL, ERROR, WARN, WARNING, INFO, DEBUG, NOTSET,
default = INFO
  -o DIRREPO, --dirrepo DIRREPO
                      repository for files, default = ./repo-masked
  --ctab CTAB          color table index in range [1,8], default = 3
  --dirmode DIRMODE    directory access mode, default = 0o2775
  --filemode FILEMODE  file access mode, default = 0o664
  --group GROUP        group ownership for all files, default = ps-users
  --savelog            On/Off saving log file, default = 1
```

## Mask Editor GUI main window

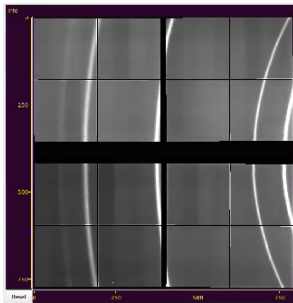
Mask Editor main window consists of sub-panels listed in this section with brief description of their functionality.



## Image with axes and cursor info panel

Image nested in center of the main window.

Displays assembled image of the detector or stack of panels if geometry constants are not available. Click and drag or scroll mouse on image to translate or zoom-in/out desired part of the image. At mouse release spectrum will be updated. for visible part of the image. The same operation on axis works for appropriate transformation of its dimension, changing aspect ratio.

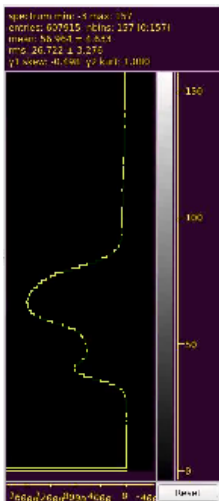


## Spectrum with statistical data

Spectral widget is displayed on the right side of the image.

It shows spectral histogram of the visible part of the image, color bar, two axes, and statistical panel on the top.

Click and drag or scroll mouse on spectrum to select its part projected on color map on image. The same works for vertical axis. Horizontal scale does the same things for histogram scale. At mouse release image will be updated.



## Color bar selection

Color bar maps intensity values to color map used on image. There are eight pre-defined color maps currently available.

To change color map - click on color bar and select color map/bar from pop-up window. The color bar and Image will be updated after selection is done.



## Logger

Most important info messages are displayed in the logger window located in the bottom part of the main window. By default it has low profile, but can be expanded by mouse using expansion mark on the top boarder of the logger window.

```
exp=ueddaq02,run=569 -a /sdf/group/lcls/ds/ana/detector/data2_test/misc/epix10kaquad-meciv2518-0101-CeO2-ave.npy
saved in file: /sdf/group/lcls/ds/ana/detector/logs/atstart/2023/2023_lcls2_masked.txt
[I] T09:43:35 psana.graphqt.MEDUtils.L0125 ndarray of shape (4, 352, 384) for image is loaded from file: /sdf/group/lcls/ds/ana/detector/data2_test/misc/
epix10kaquad-meciv2518-0101-CeO2-ave.npy
[I] T09:43:35 psana.graphqt.MEDUtils.L0134 geometry text is loaded from DB for exp: ueddaq02 det: epix10ka_000001 run: 1
```

## Control panel

Control panel with multiple fields allows to set imaging array and geometry constants from DB or files.



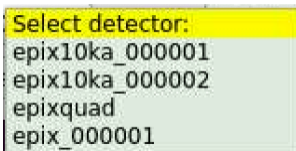
## Select DB parameters

After click on the button next to **DataSource**: label a bunch of sequentially pop-up windows for instrument, experiment, and run number allows to set DB parameters. To terminate selection - click on highlighted-yellow title.



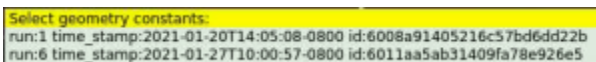
## Select detector

After click on the button next to **Detector**: label pop-up menu window allows to select detector from specified DB



If geometry is available for specified DataSource and Detector the field next to geo DB will be filled out automatically.

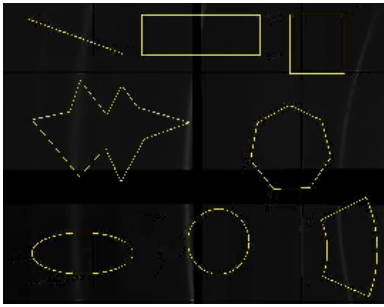
If many geometry constants available for specified detector, click on button next to **geo DB**: label and select desired constants from pop-up menu window.



## Select files

Use standard dialog to select I/O files





### Add/Remove PIXEL and PIXGROUP

Right after click on **Add** button and selection of **PIXEL** or **PIXGROUP** ROI, start clicking on desired pixels or click-hold-and-pan. Added pixels will be marked by color. Double click removes appropriate pixel. Input of the PIXGROUP is completed by the click on Compl.(ete) button.



### Button Cancel

Button **Cancel** cancels adding of non-completed ROI if it is not too late...

### Button Compl.

Button **Compl.** completes adding of ROI with multi-point definition like PIXGROUP and POLYGON.

### Select and Delete ROIs

Currently **Select** mode is used in combination with **Delete** in order to preview deleting ROI.

Click on **Select** button, then on ROIs to select. Selected items will change color.

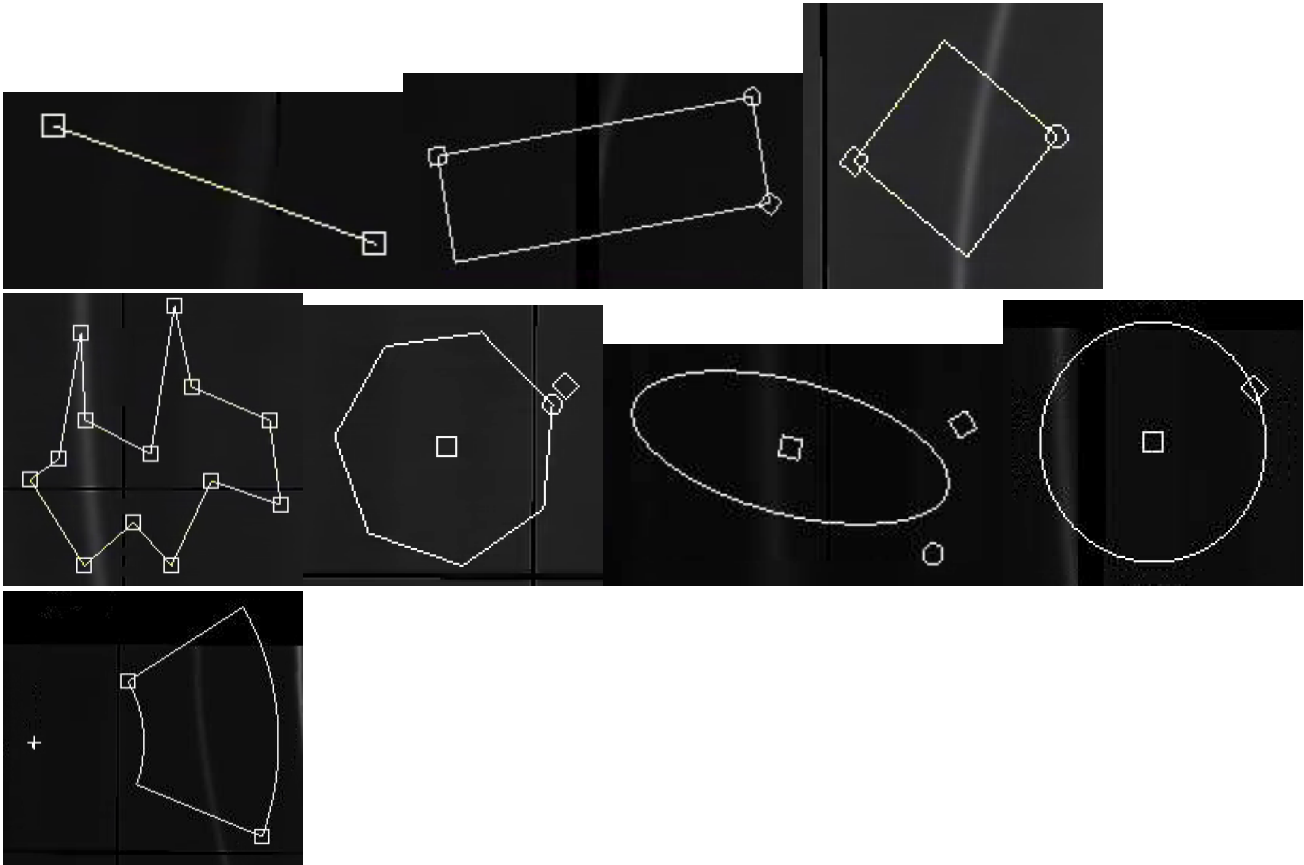
PIXEL type ROI will be selected one-by-one. PIXGROUP ROI will be selected as whole by a single click.

### Invert bad pixel region

Click on button **Invert** then select ROIs to invert region of good/bad pixels. By default internal region of each ROI is marked as bad pixels. Operation Invert inverts this definition.

### Edit mode

Click on **Edit** button, then on ROIs to edit. Selected for edition ROI changes color and shows control handle. Then, click and pan control handles to translate, resize or rotate ROIs.



## Save/restore ROI constants

Current ROIs parameters can be saved in json file by clicking on **Save** button and selecting output file name

```
[I] T09:55:17 psana.graphqt.GWViewExt:L0400 GWViewImageROI.save_parameters in file /sdf/home/d/dubrovin/LCLS/con-lcls2/repo-masked/roi_parameters.json
ROI_0000: {'roi_name': 'LINE', 'roi_type': 2, 'points': [(63.55, 80.49), (248.68, 144.1)]}
ROI_0001: {'roi_name': 'RECT', 'roi_type': 4, 'points': [(287.36, 73.99), (516.69, 146.69)], 'angle': -9.992074539790755}
ROI_0002: {'roi_name': 'SQUARE', 'roi_type': 8, 'points': [(574.72, 72.7), (694.47, 192.45)], 'angle': -13.433996647005657}
ROI_0003: {'roi_name': 'POLYGON', 'roi_type': 16, 'points': [(74.6, 264.82), (167.17, 368.68), (216.9, 315.45), (247.29, 377.76), (292.89, 299.87), (379.92, 270.02), (280.45, 242.76), (248.68, 202.51), (219.66, 255.74), (168.55, 193.43), (147.82, 250.54), (147.82, 250.54)]}
ROI_0004: {'roi_name': 'POLYREG', 'roi_type': 32, 'points': [(563.67, 260.93), (60.79, -51.93), (8.29, -14.28)], 'nverts': 7, 'radius': 79.94657779736607, 'angle': -40.504853284715715}
ROI_0005: {'roi_name': 'ELLIPSE', 'roi_type': 64, 'points': [(74.6, 545.23), (269.4, 469.93)], 'angle': 13.773114386507924}
ROI_0006: {'roi_name': 'CIRCLE', 'roi_type': 128, 'points': [(325.29, 411.62), (470.47, 556.8)]}
ROI_0007: {'roi_name': 'ARCH', 'roi_type': 256, 'points': [(522.22, 502.39), (607.87, 450.46), (729.45, 582.87)]}
```

Button Load loads constants from json file and draws ROIs on image.

## Mask

Button **Mask** creates mask for drawn ROIs and save it in files for 2-d image (with suffix "-2d") and 3-d array (for panels like in data).

## References

- [Mask Editor](#) - for LCLS(1)
- [Mask Editor Development Notes](#)
- [Detector Calibration Constants Deployment](#)
- [Detector geometry constants deployment](#)
- [Bad Pixel Status](#)
- [LCLS-II Calibration DB](#)
- [Private Calibration Constants](#)
- [cdb](#) - CLI for management of calibration DB
- [calibman](#)
- [Calibration Scripts Repository and Logging](#)