CENTER FOR ASTROPHYSICS
HARVARD & SMITHSONIAN

Using SAOImage ds9 and dax

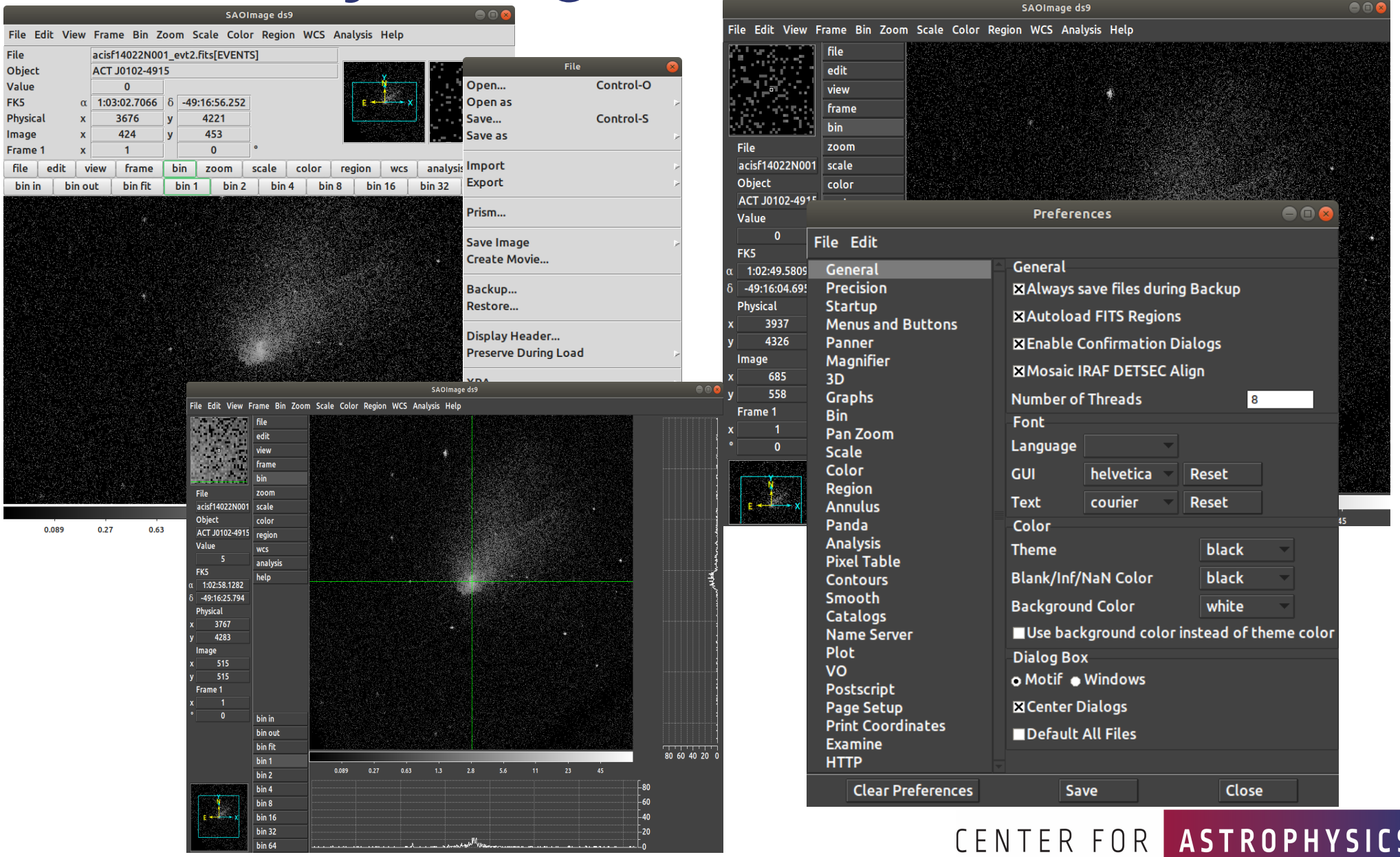
Kenny J. Glotfelty

Introduction

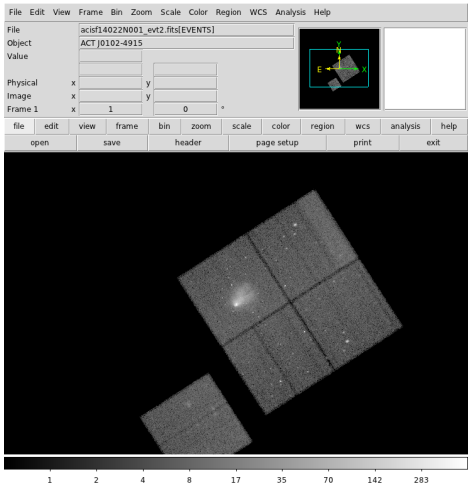
- Reference these Jupyter notebooks:

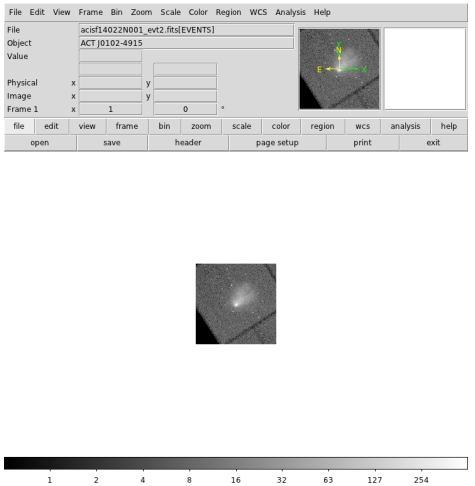
  https://github.com/kglotfelty/ds9_dax_demo
- Some basic and advanced ds9 features

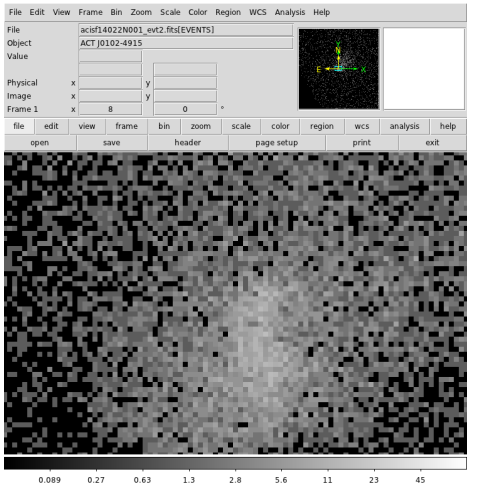
ds9 | Adjusting the User Interface

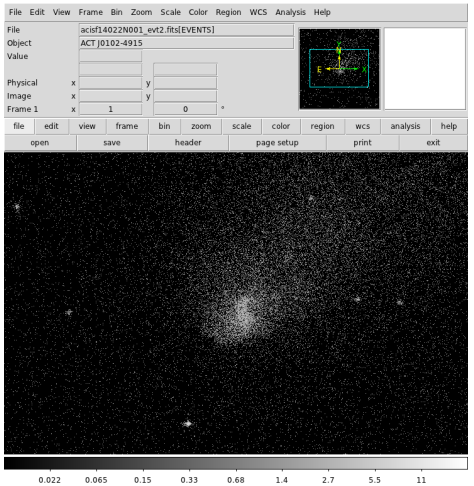


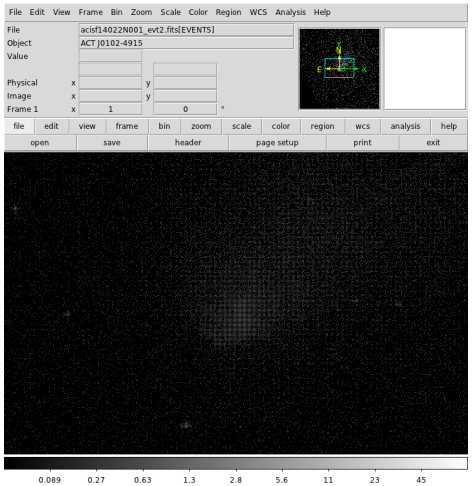
ds9 | Bin, Block, Zoom

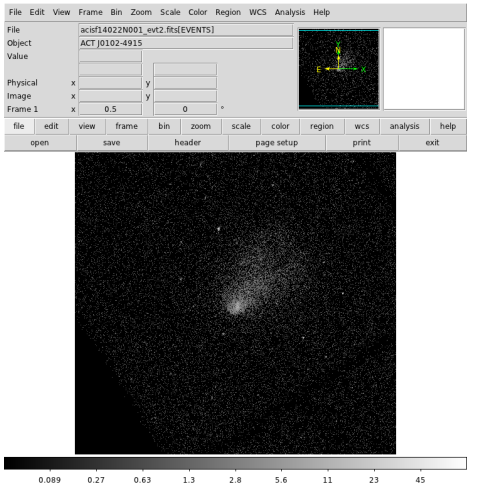












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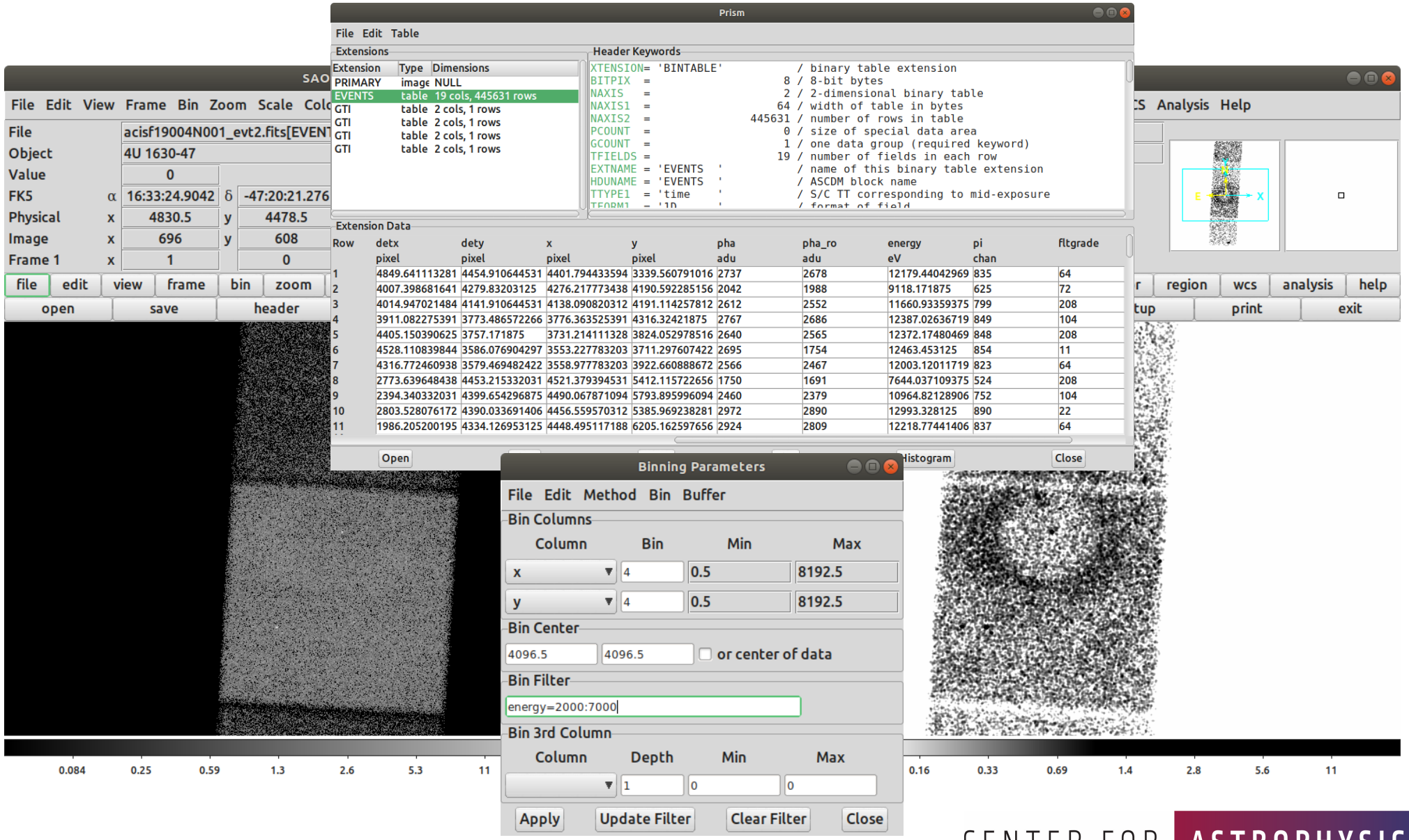
ds9 | Filtering



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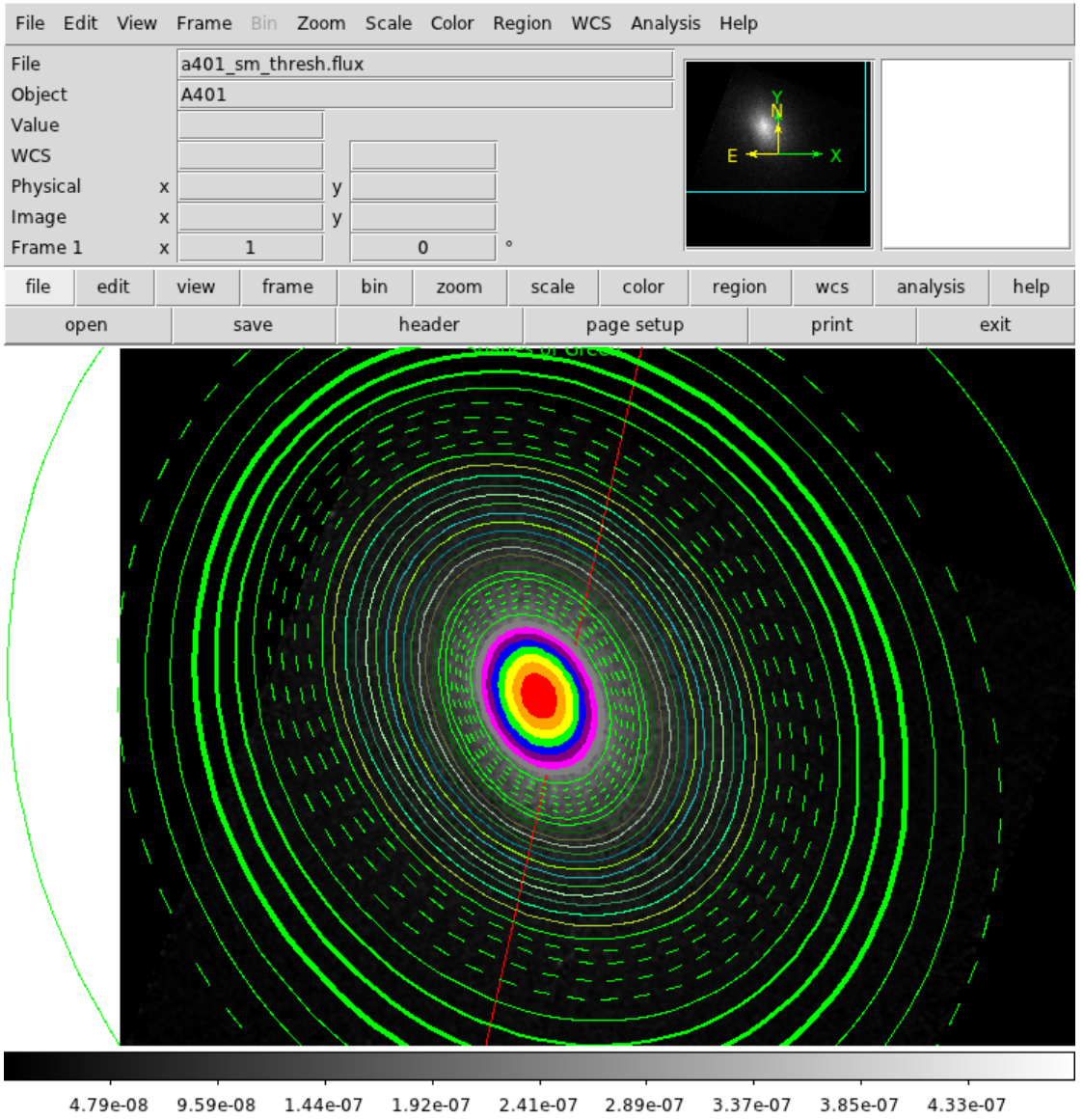
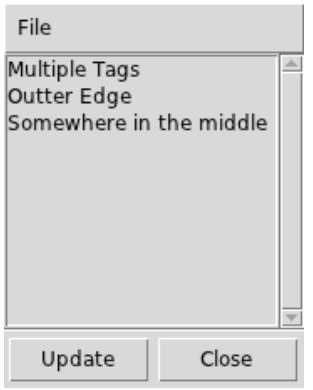
ds9 | Regions | Decorations





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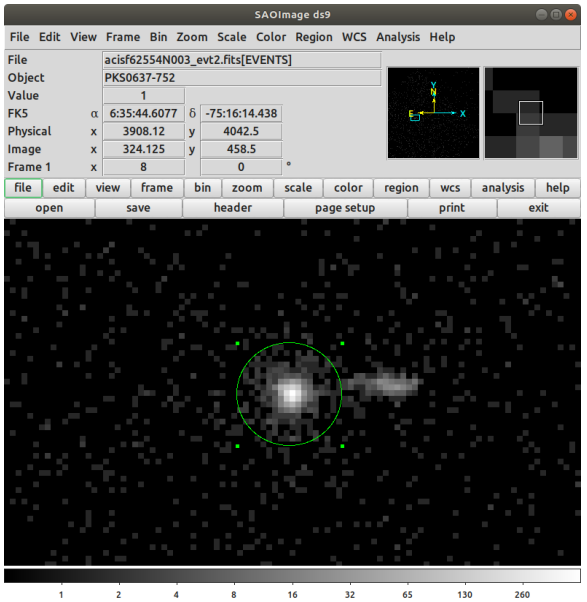
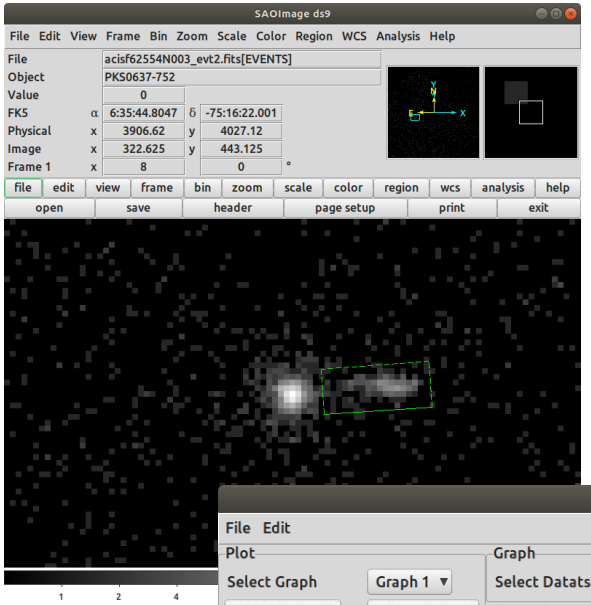
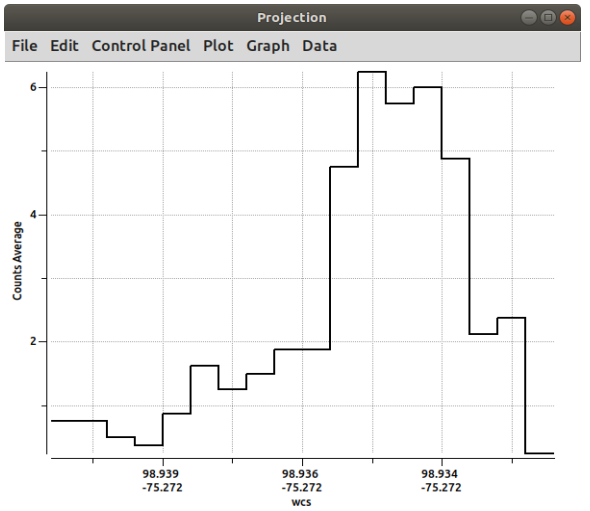
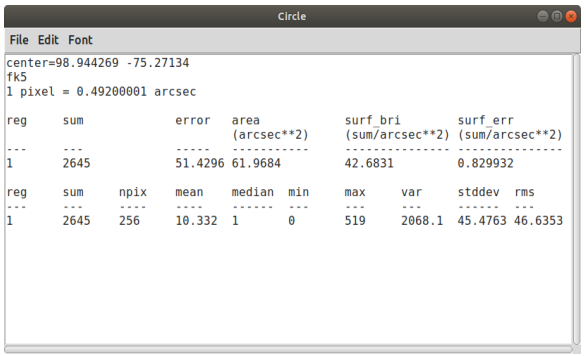
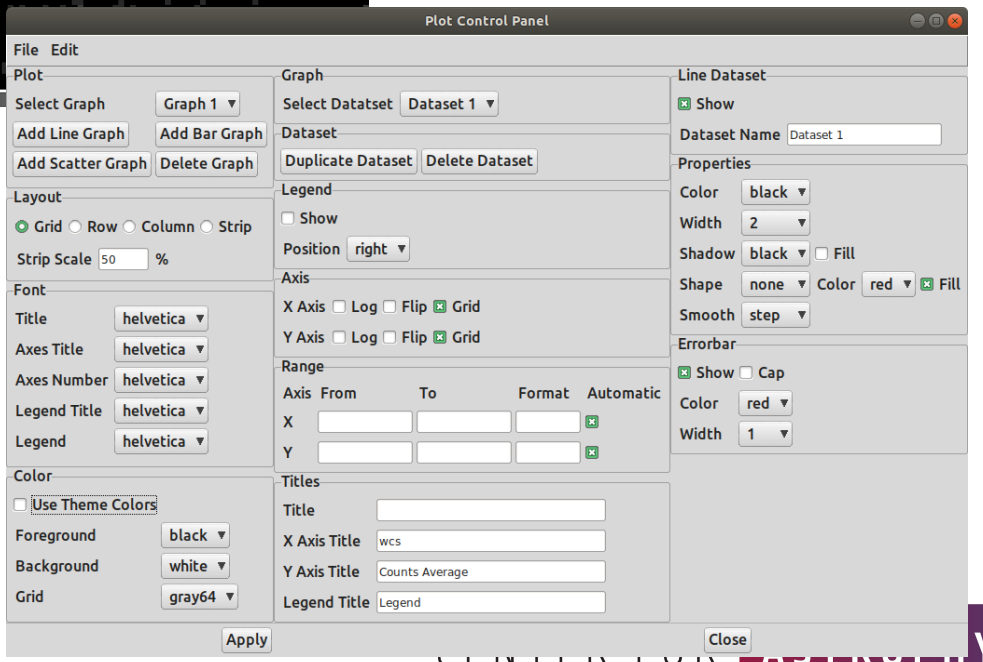
ds9 | Regions | Analysis



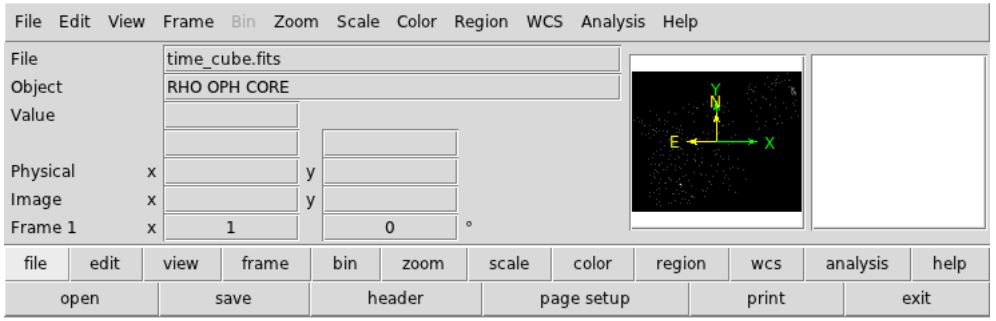


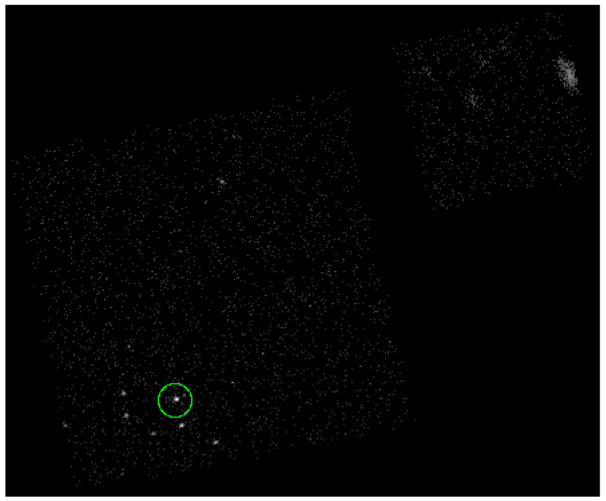


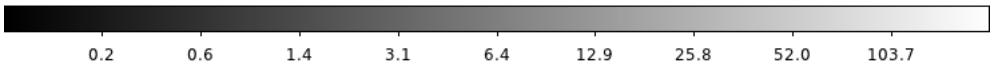


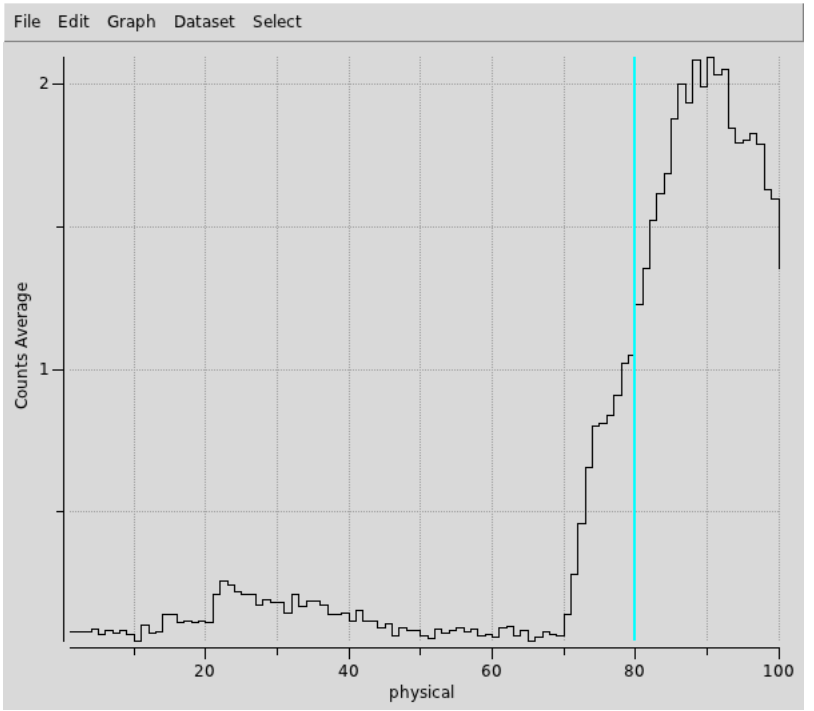


ds9 | Regions | Cubes









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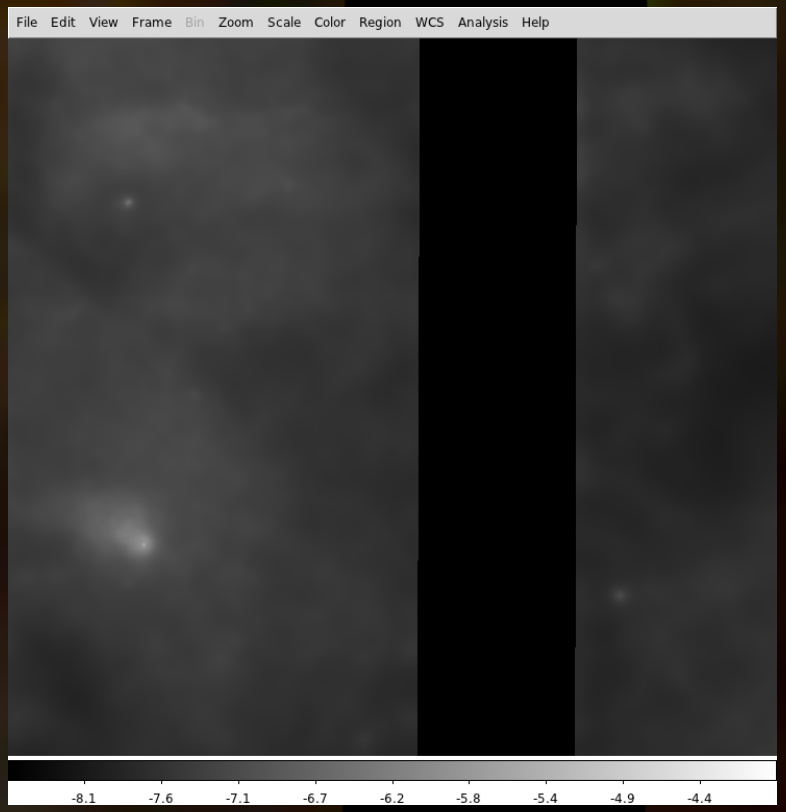
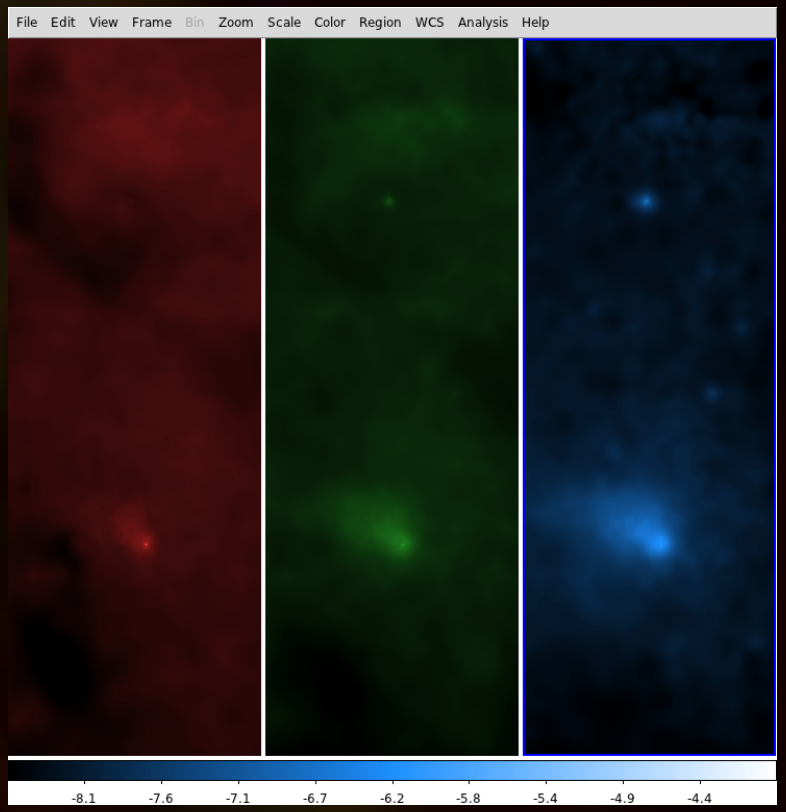
ds9 | RGB | Multi-Wavelength





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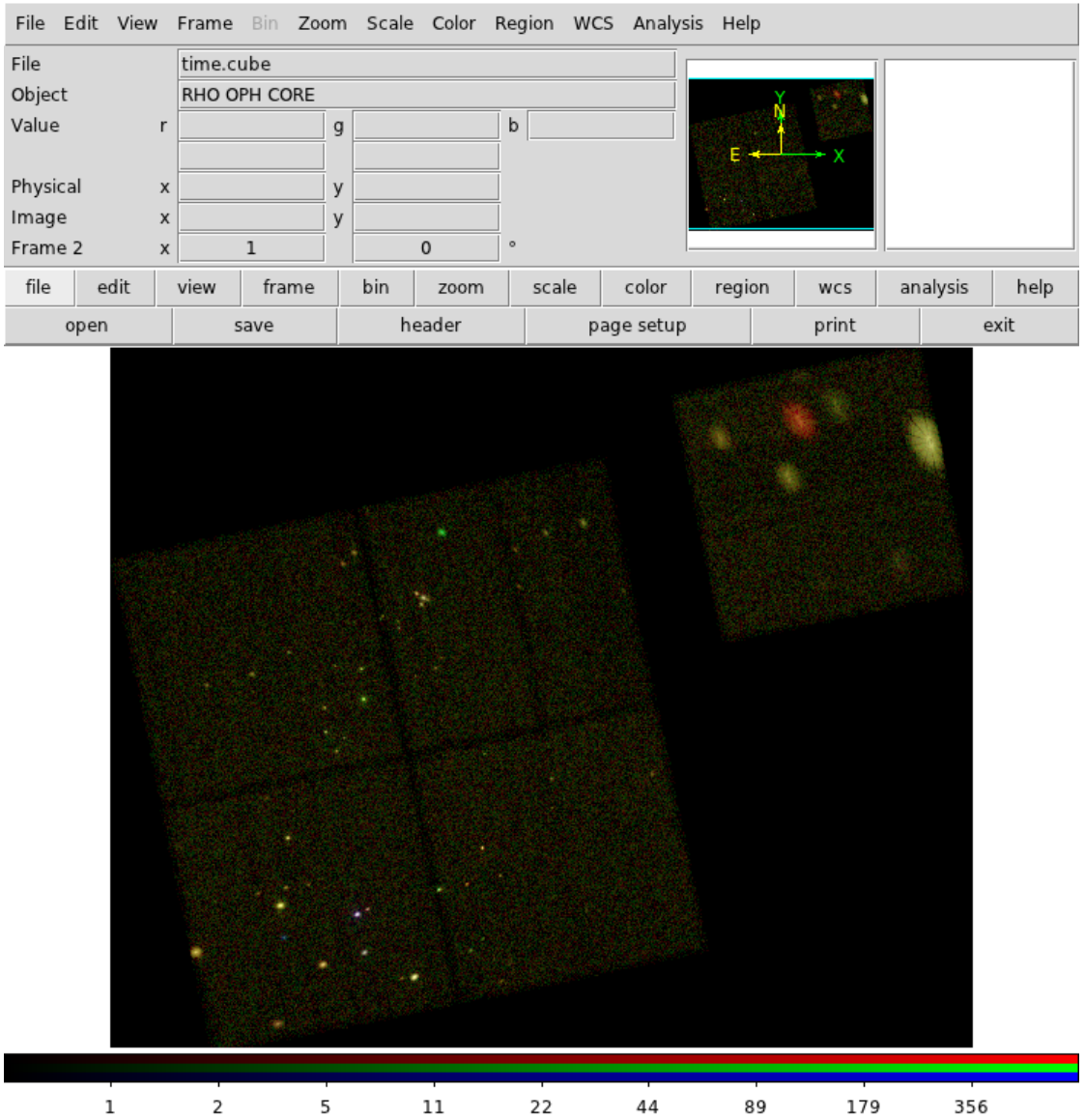
ds9 | RGB | Time



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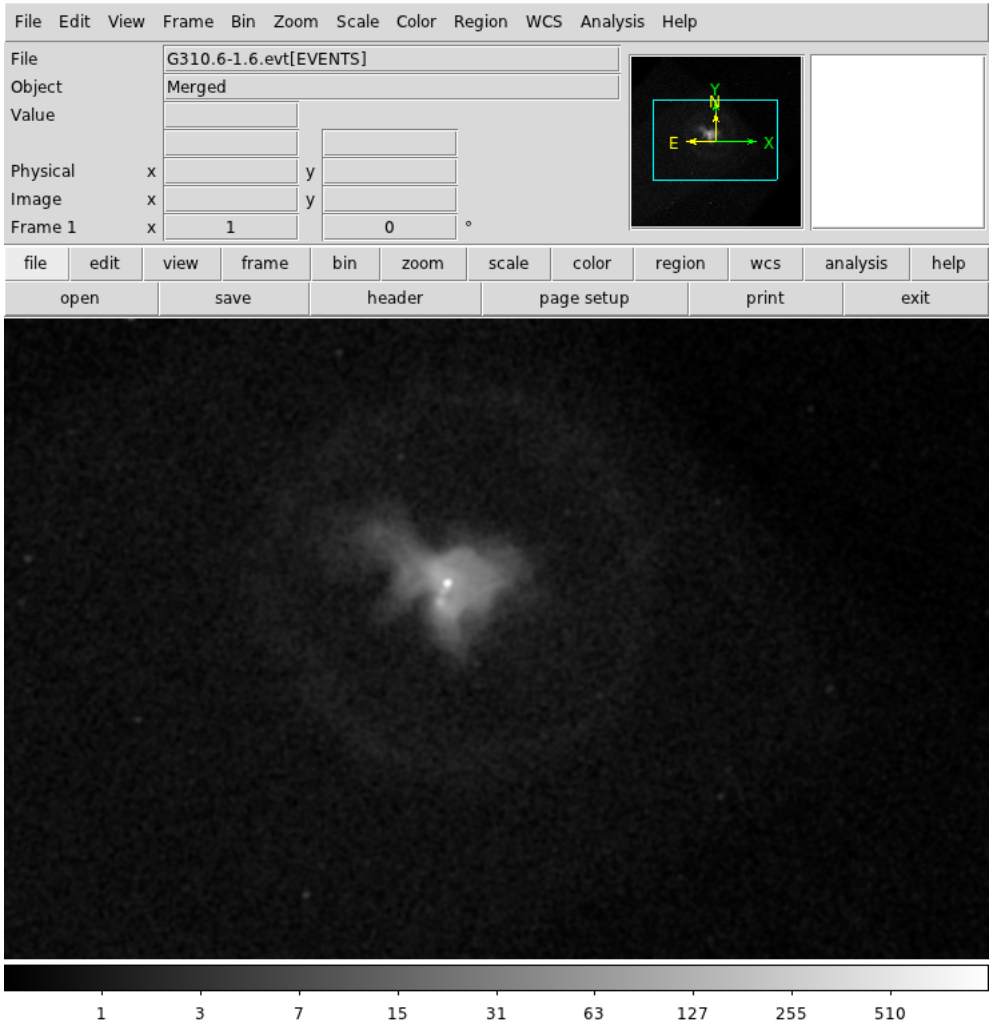
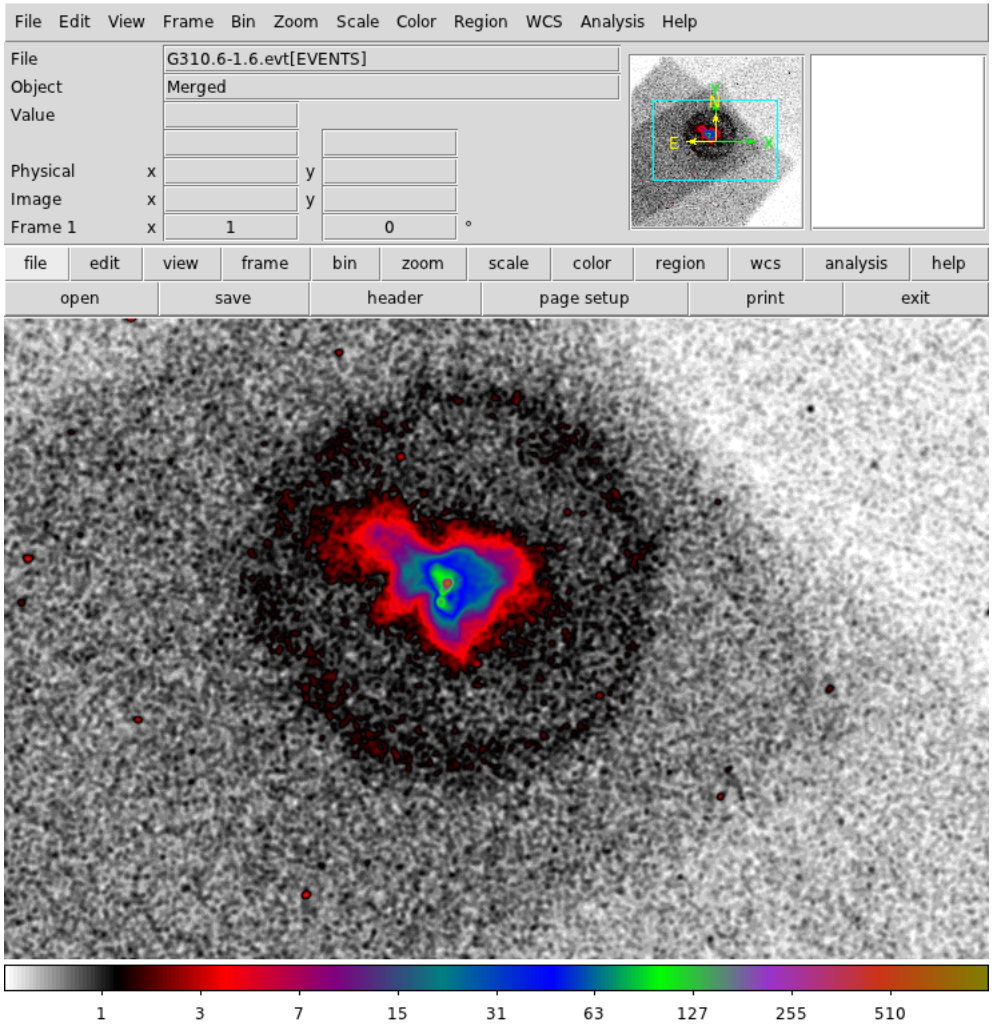
ds9 | Color Look Up Tables





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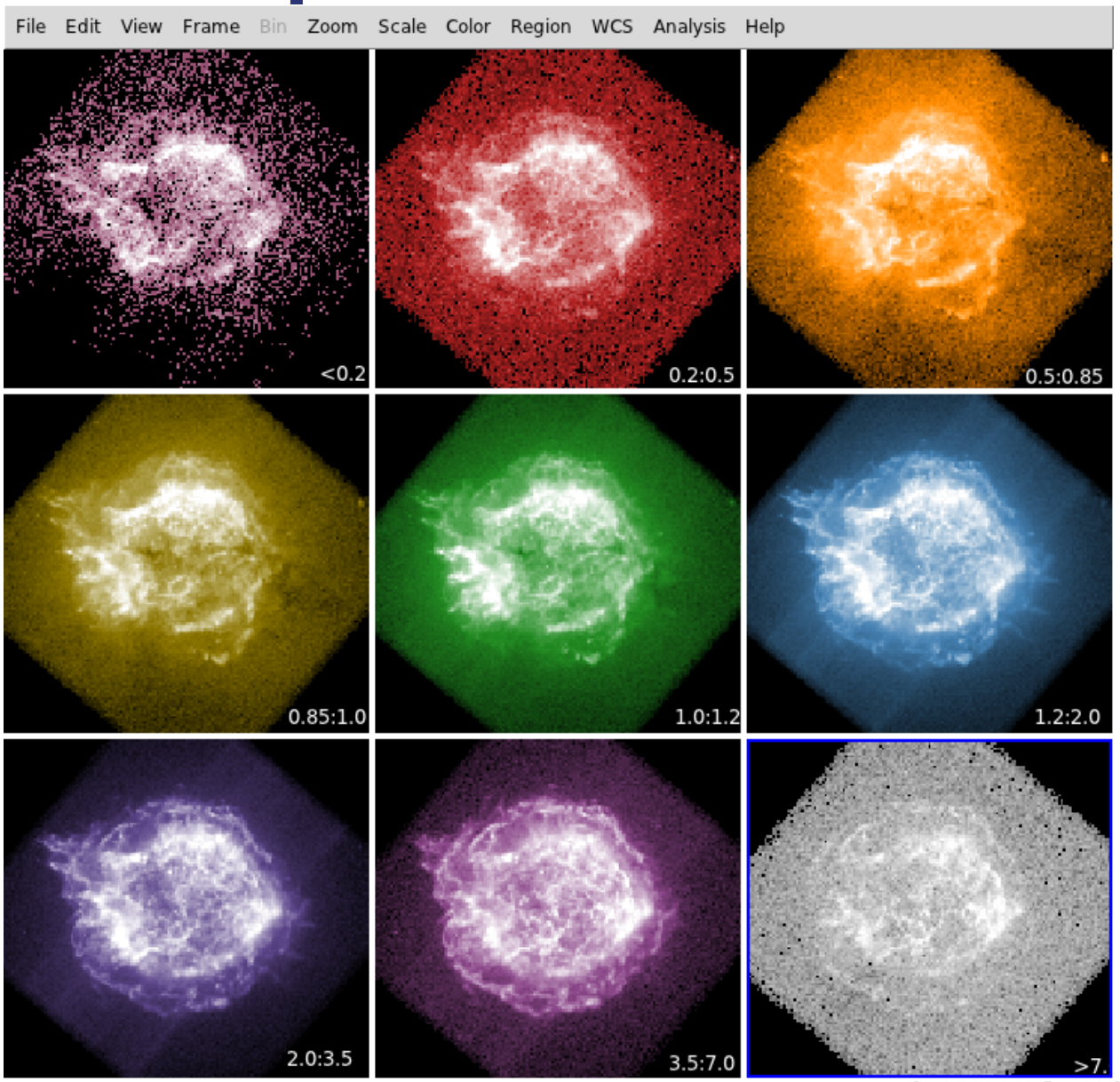
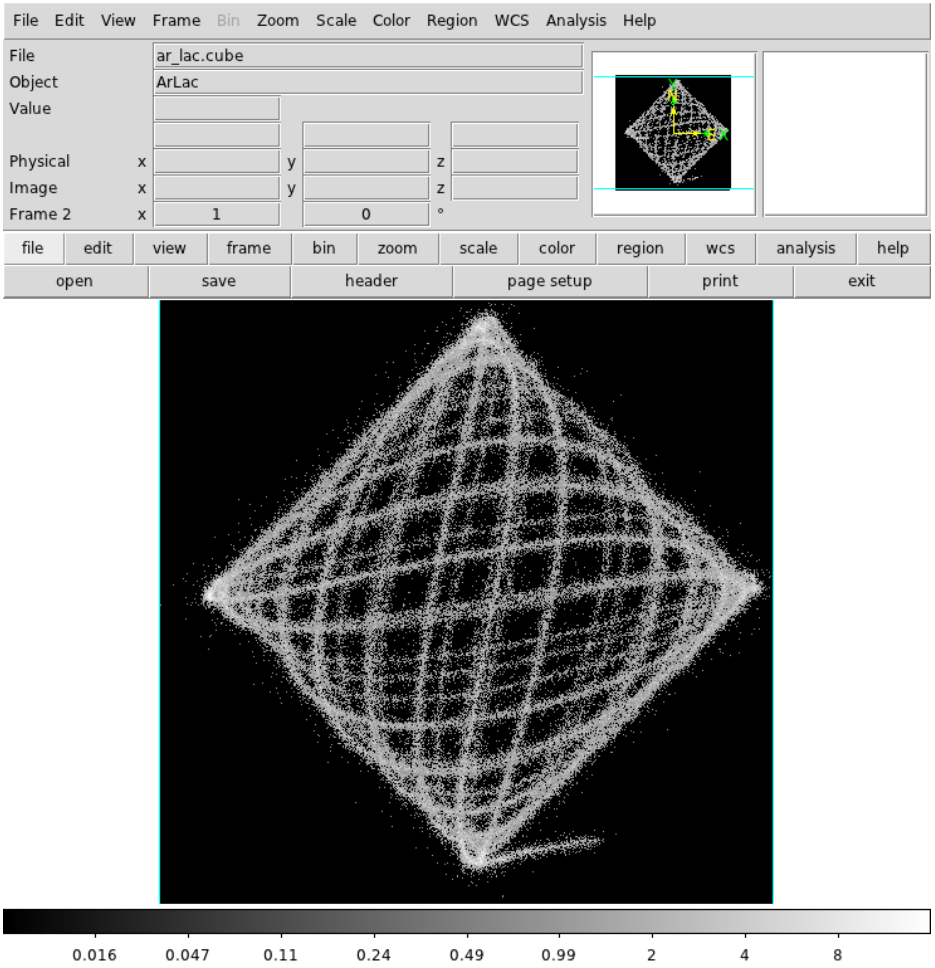
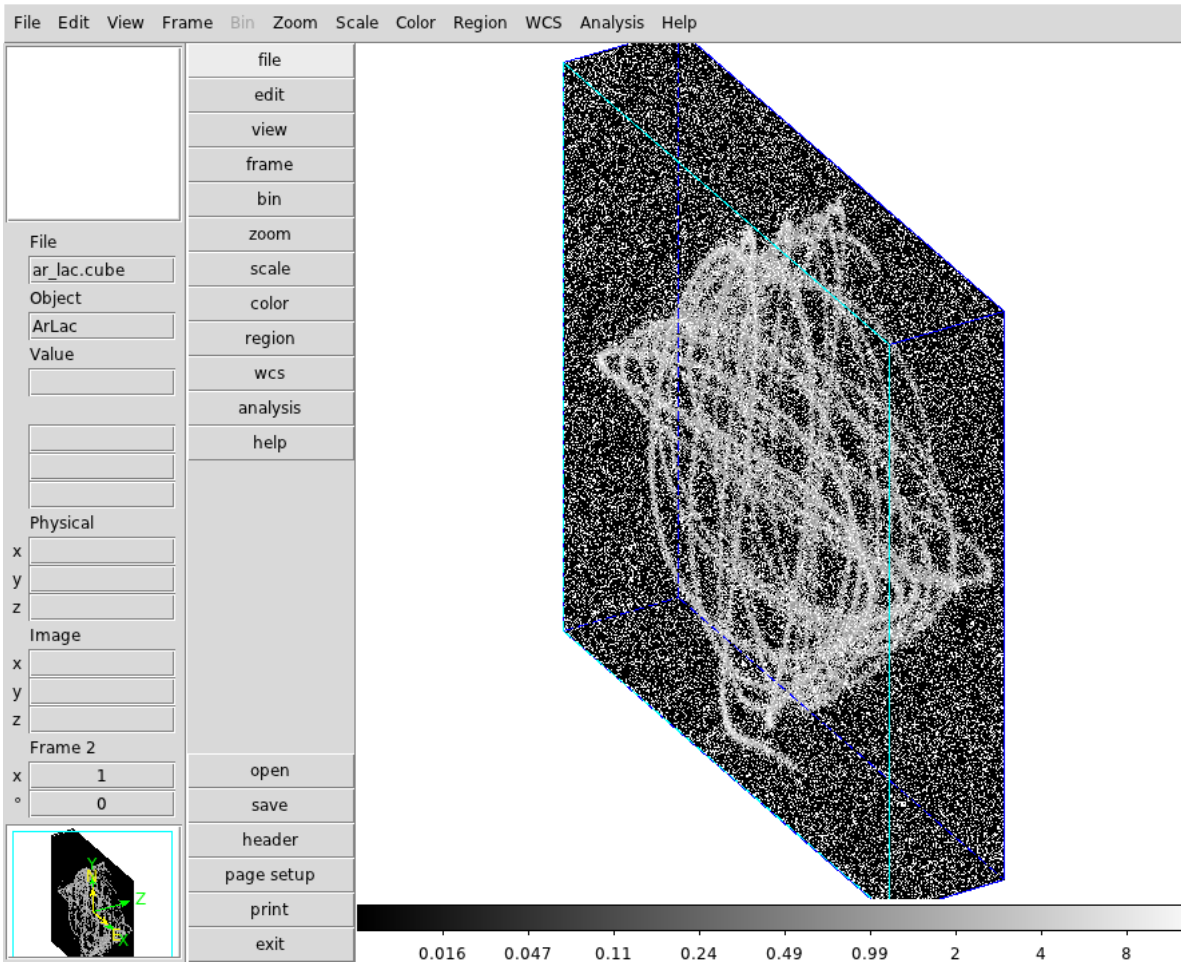
ds9 | Backup & Restore



ds9 | 3D Rendering





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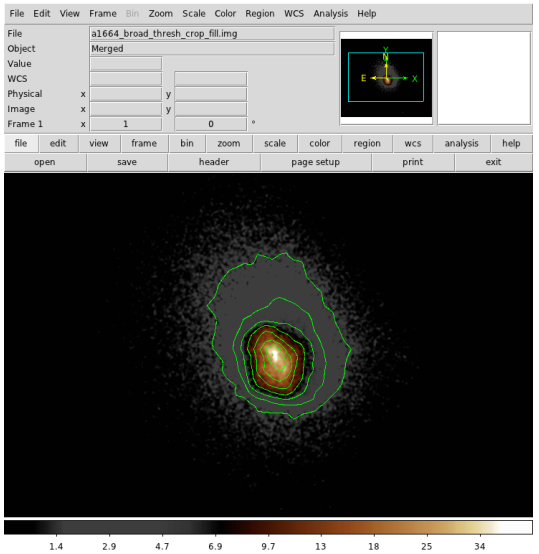
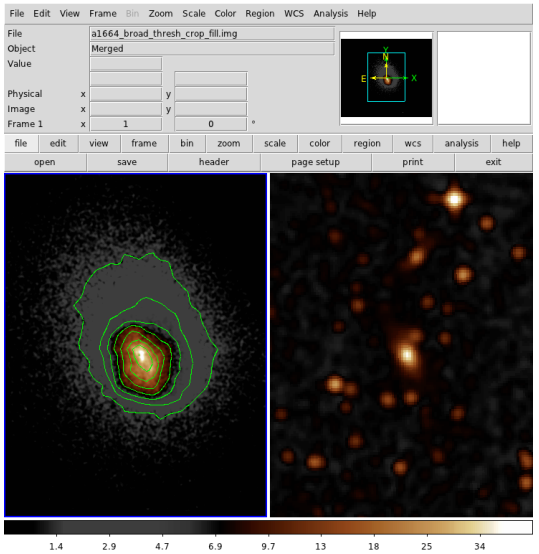
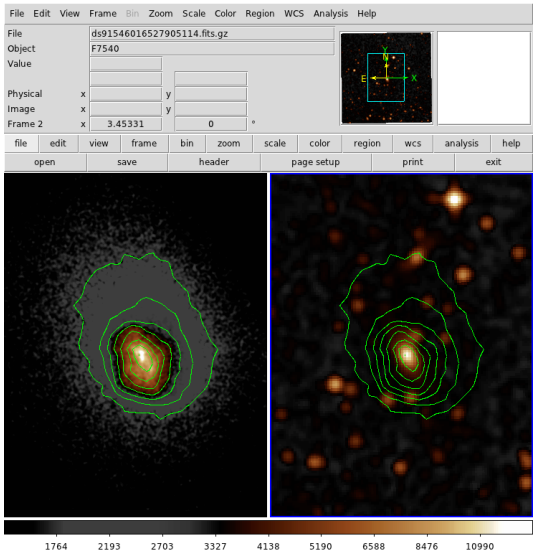
ds9 | Contours







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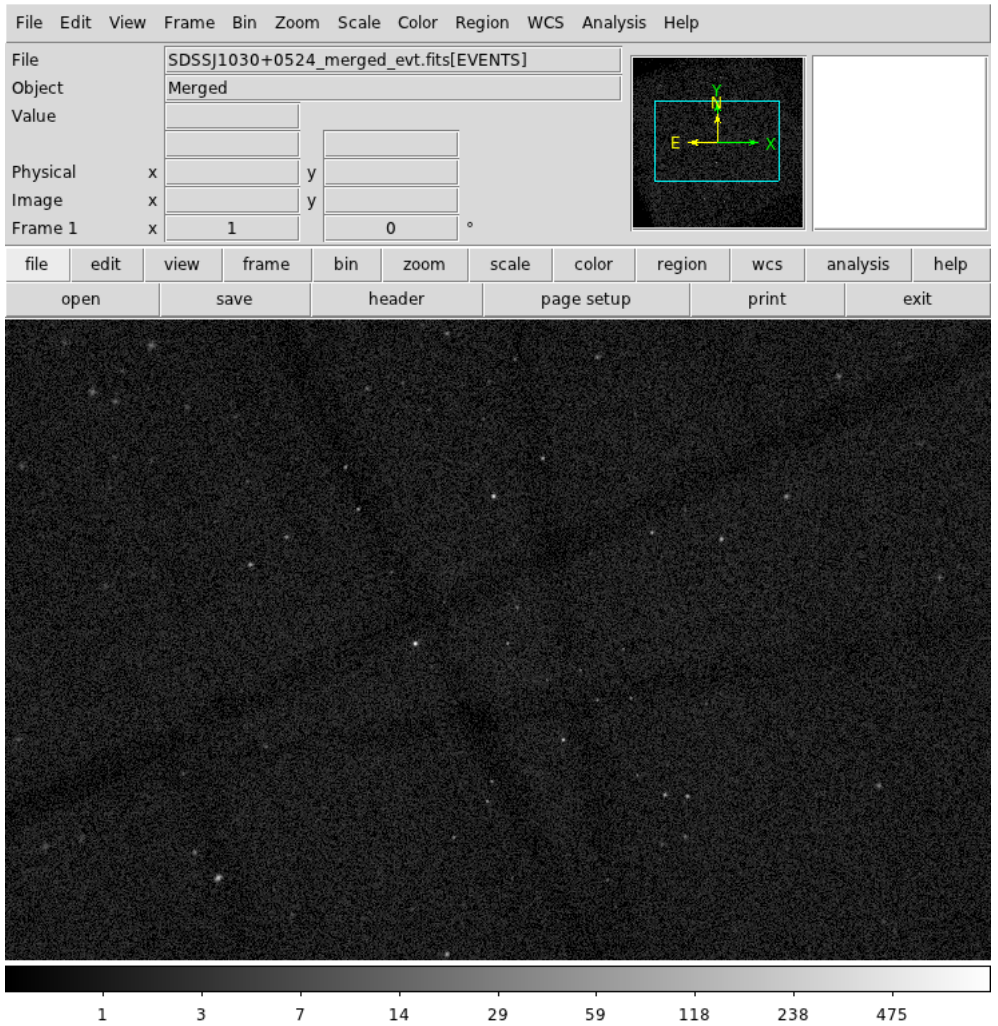
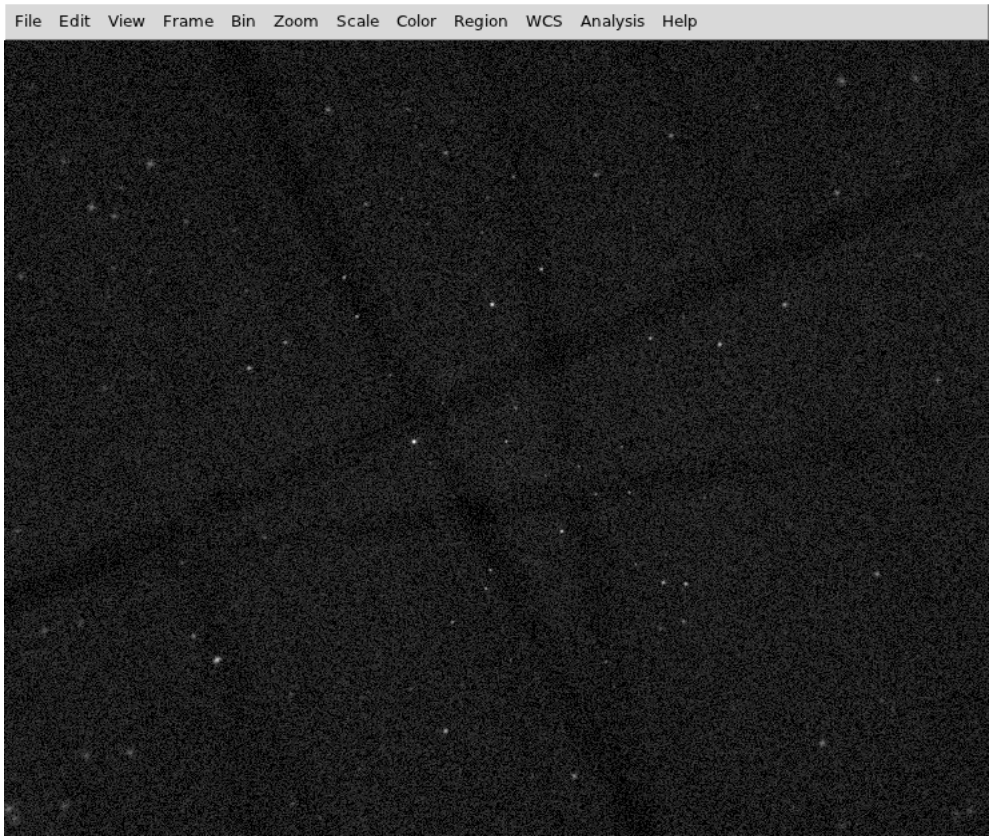
ds9 | Analysis Menu





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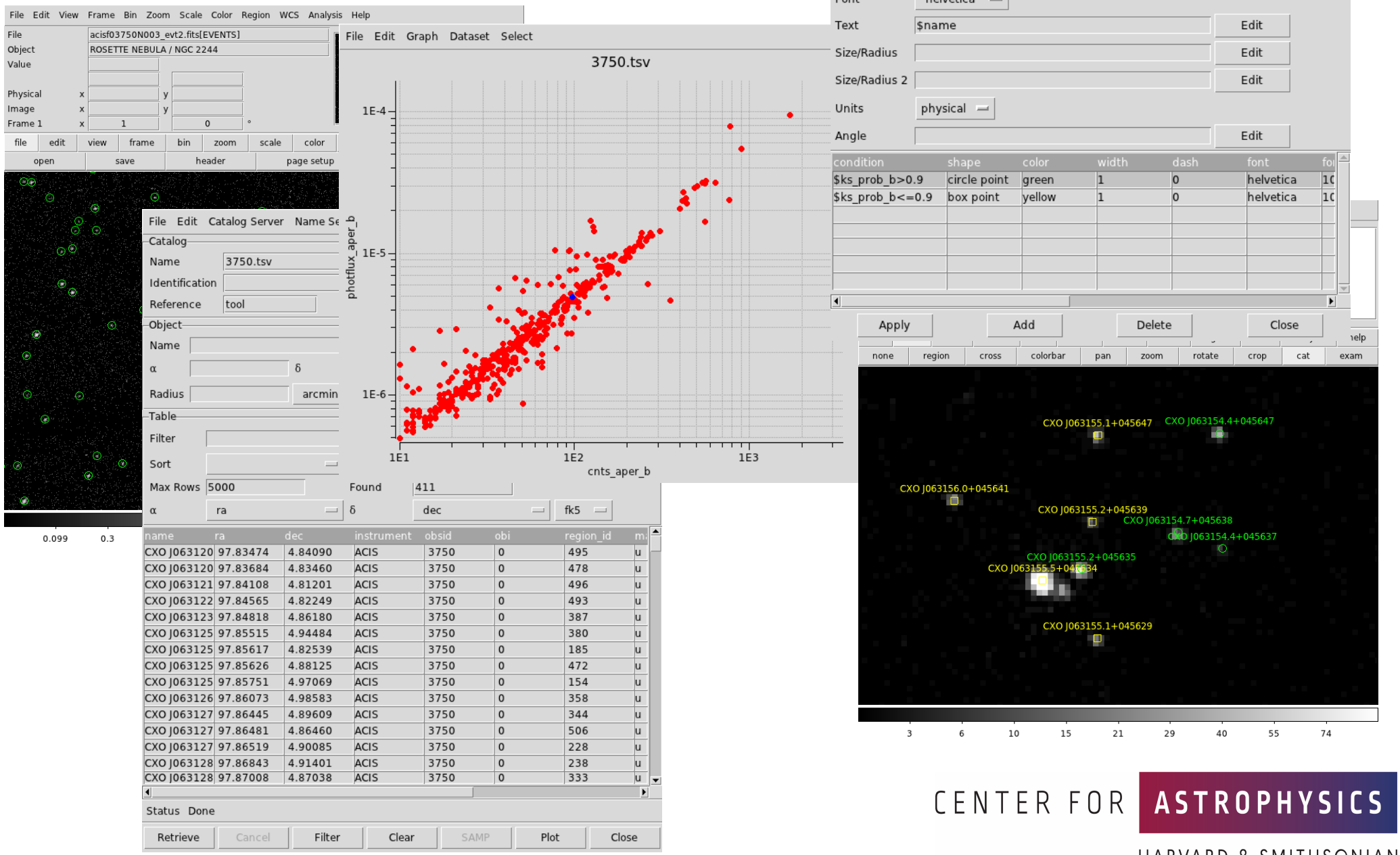
ds9 | Catalog



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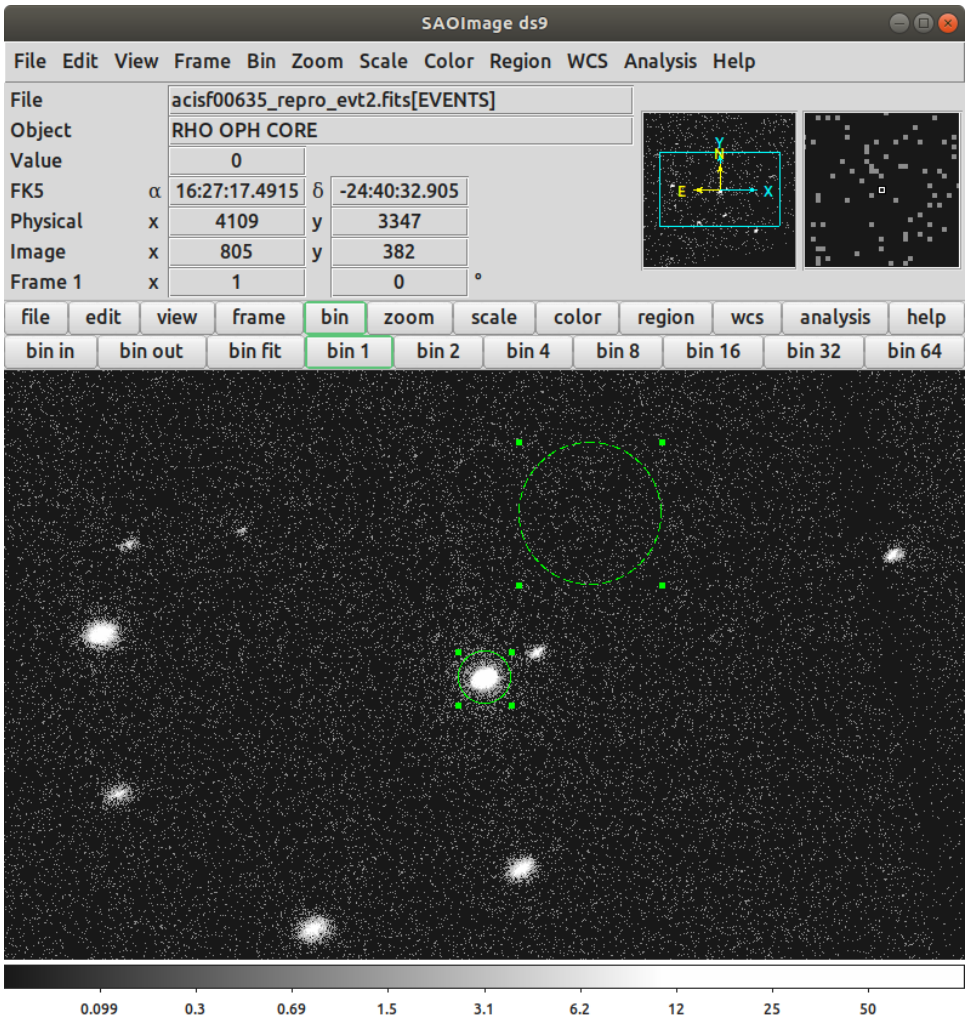
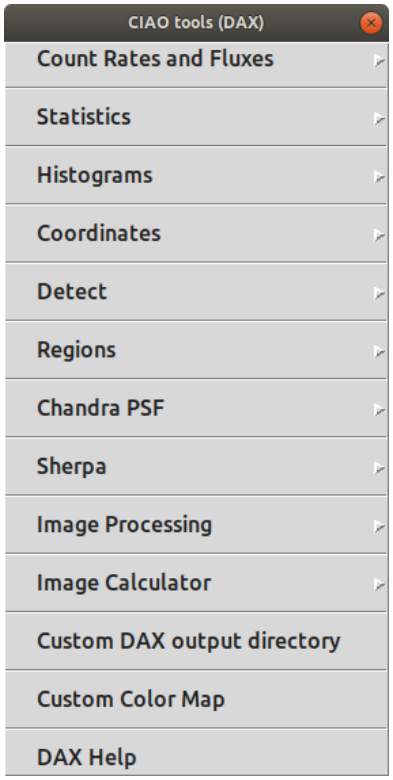
dax | Introduction





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dax | Statistics

File Edit Font

```
#===== 2018-12-28 12:08:57 =====
#File: acisf00635_repro_evt2.fits[EVENTS]

#Background subtracted data

#COMPONENT      NET_COUNTS      NET_ERR         NET_RATE        CEL_AREA        CEL_BRI         CEL_BRI_ERR
#               count           count           count/s         arcsec**2       count/arcsec**2 count/arcsec**2
 1              22893           151.304         0.227383        1539.94         14.8661         0.0982531


#source region(s):
#circle(3814,3466,45)

#COMPONENT      COUNTS          COUNT_RATE      AREA
#               count           count/s         pixel**2
 1              22893           0.227383        6361.73
```

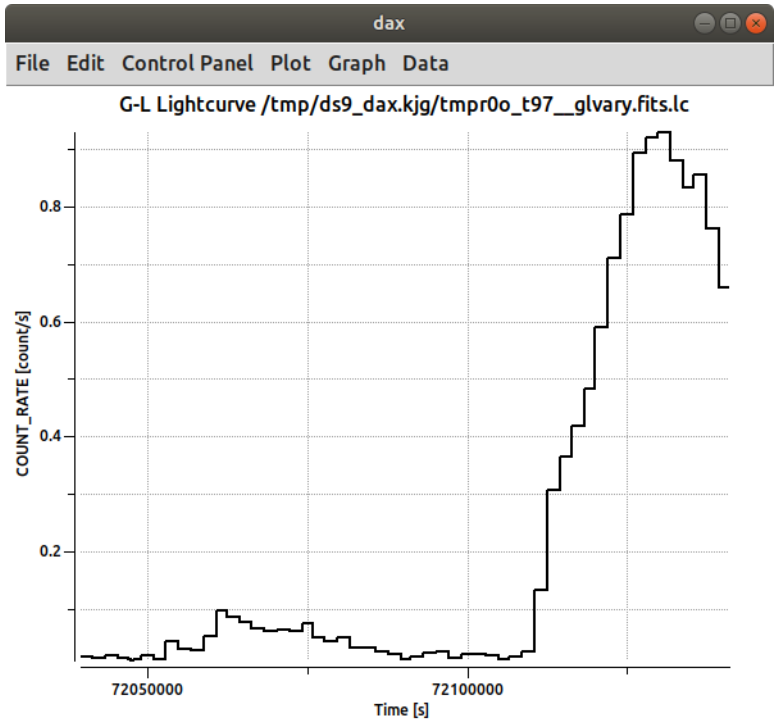
File Edit Font

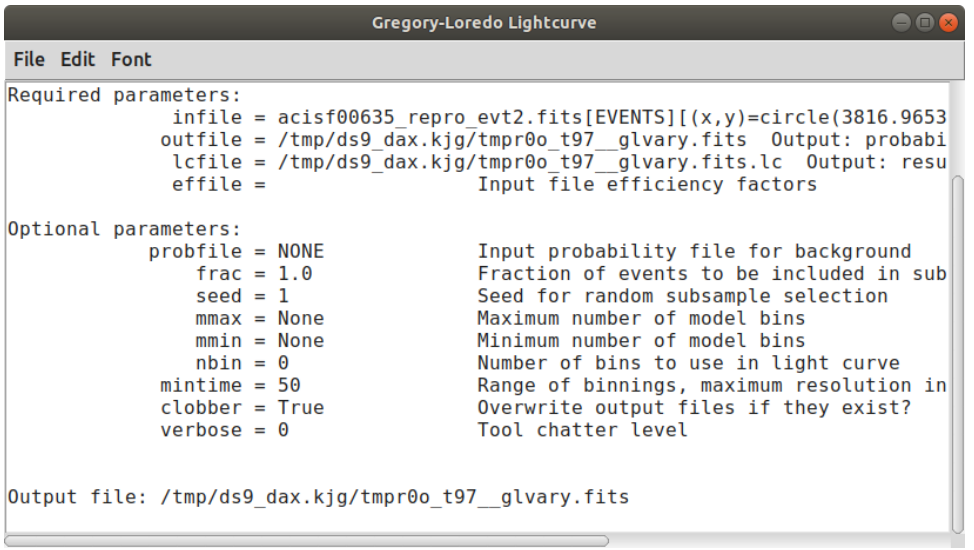
```
Adding net rates to output
Appending flux results onto output
Appending photflux results onto output
Computing Net fluxes
Adding model fluxes to output
Scaling model flux confidence limits


Summary of source fluxes

      Position                              0.5 - 7.0 keV
                                            Value        90% Conf Interval
#0001|16 27 28.02 -24 39 33.6 Rate          0.209 c/s (0.206,0.211)
                              Flux          5.15E-12 erg/cm2/s (5.09E-12,5.21E-12)
                              Mod.Flux      2.06E-12 erg/cm2/s (2.04E-12,2.09E-12)
                              Unabs Mod.Flux 2.54E-12 erg/cm2/s (2.51E-12,2.57E-12)


Output files are located in /tmp/ds9aper.kjg/4162/
```

File Edit Font

```
#source region(s):
#circle(3814,3466,45)

#COMPONENT      COUNTS          COUNT_RATE      AREA
#               count           count/s         pixel**2
 1              22893           0.227383        6361.73

#===== 2018-12-28 12:09:14 =====
#File: acisf00635_repro_evt2.fits[EVENTS]

#Background subtracted data

#COMPONENT      NET_COUNTS      NET_ERR         NET_RATE        CEL_AREA        CEL_BRI         CEL_BRI_ERR     BGREG_COUNTS    BGREG_ERR
#               count           count           count/s         arcsec**2       count/arcsec**2 count/arcsec**2 count           count
 1              22457.3         151.759         0.223055        1539.94         14.5832         0.0985485       435.691         11.7412


#source region(s):
#circle(3814,3466,45)

#COMPONENT      COUNTS          COUNT_RATE      AREA
#               count           count/s         pixel**2
 1              22893           0.227383        6361.73


#background region(s):
#circle(3878,3742,80)

#BG_COUNTS      BG_RATE         BG_AREA
#count          count/s         pixel**2
 1377           0.0136769       20106.2
```

dax | Histograms





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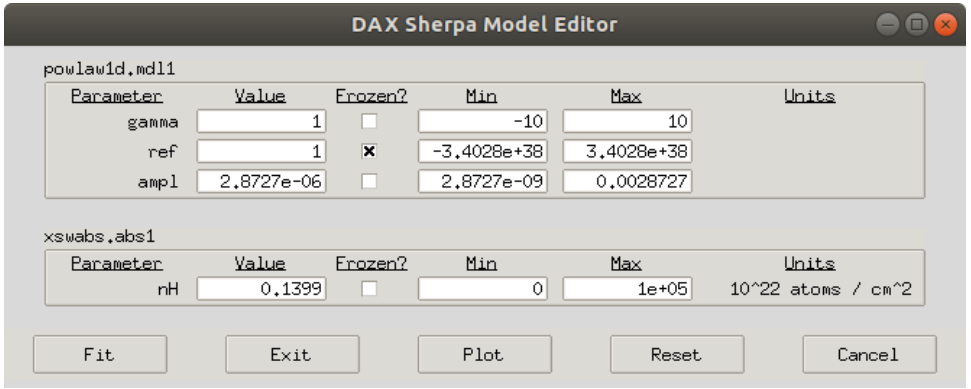
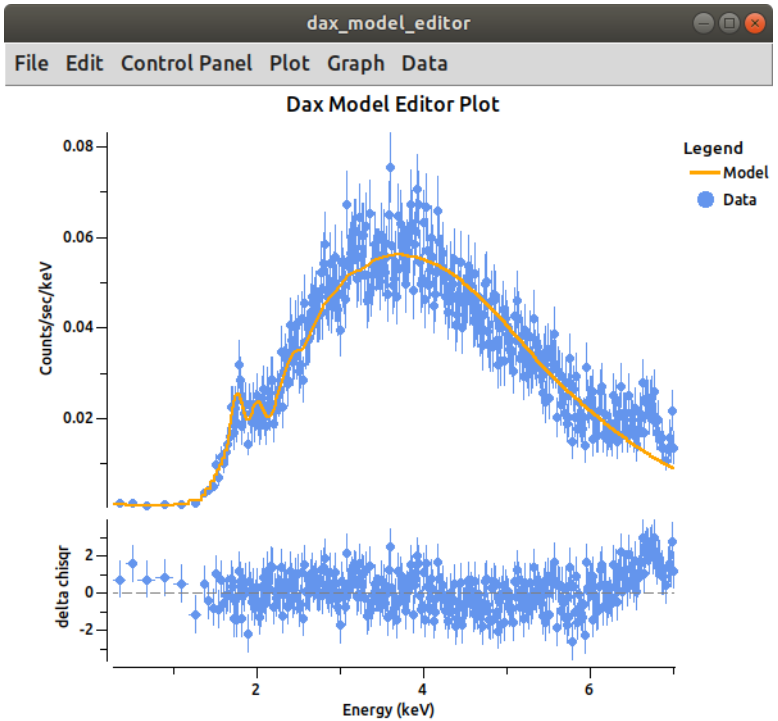
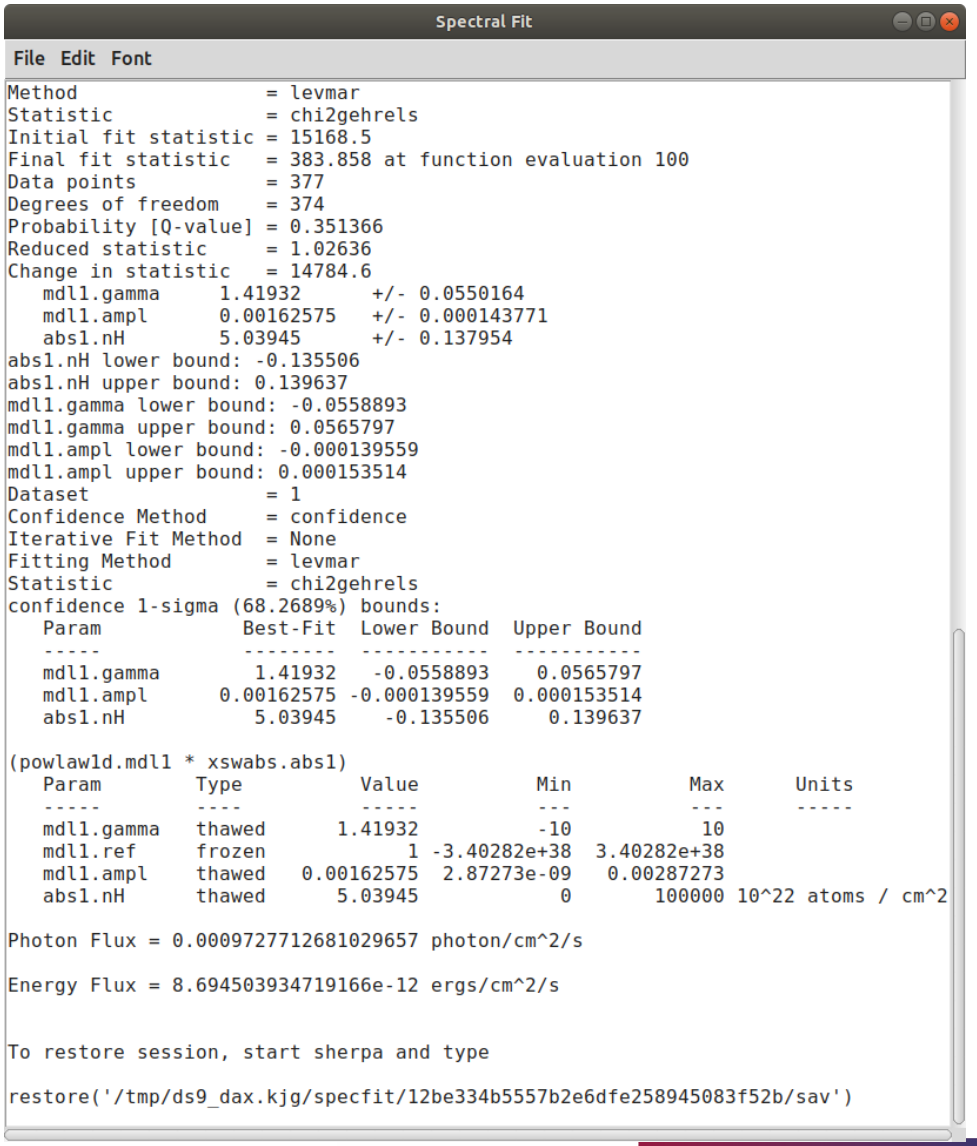
dax | Sherpa







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Summary

- Some interesting topics not covered
  - Mosaics
  - SAMP
  - Masks
  - Composite and Template Regions