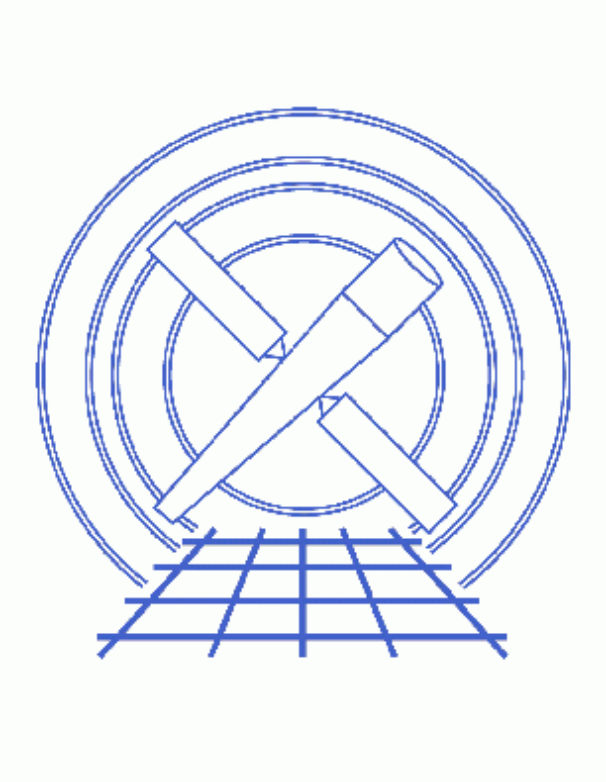
Create an Order−Sorting Image



CIAO 3.4 Science Threads

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URL: http://cxc.harvard.edu/ciao/threads/osort_image/ Last modified: 1 Dec 2006

Create an Order−Sorting Image

CIAO 3.4 Science Threads

Overview

Last Update: 1 Dec 2006 − reviewed for CIAO 3.4: no changes

Synopsis:

An order sorting image allows the user to visualize how the chip energy of an event compares to the energy determined from the distance to the source and the assigned order.

Purpose:

To create an image which shows the density of events in different orders.

Read this thread if:

you are working with an ACIS grating observation and would like to view how orders were assigned to each event. It is not possible to perform order sorting for HRC data (all events go either 0, +/−1, or 99), so there is no purpose in running this thread.

Related Links:

- Analysis Guide for Chandra High Resolution Spectroscopy: an in−depth discussion of grating analysis.

Proceed to the HTML or hardcopy (PDF: A4 | letter) version of the thread.

Getting Started

Sample ObsID used: 1010 (ACIS−S/HETG, Capella)

File types needed: evt1a

This thread uses the `tg_osort_img` script. The most recent version of `tg_osort_img` is v0.7 (12 December 2005):

```
unix% grep Version `which tg_osort_img`
% Version 0.7 (2005.12.07)
```

Please check that you are using the most recent version before continuing. If you do not have the script installed or need to update to a newer version, please refer to the Scripts page.

It is noted in the screen output that the script imports the ISIS module; this is included in the CIAO binary tarballs, so it is not necessary to download anything additional before running the script.

Run tg_osort_img

The script requires only an input evt1a file and output root name to run:

```
unix% tg_osort_img acisf01010_000N001_evt1a.fits 1010
Imported ISIS module version 1.3.0
% Reading  acisf01010_000N001_evt1a.fits
% # events  =  1375572
% Osipfile =  NULL
% Processing file acisf01010_000N001_evt1a.fits
% Grating HETG
```

The OSIP filename is taken from the input file header and is for informational purposes only. If the keyword is missing from the header, the script will return "`% Osipfile = NULL`" (as shown above) and continue to run; there are no adverse effects on the output image.

There are two plots produced for each grating arm; in the case of HETG data, this is four files total (two each for the HEG and MEG arms):

- `1010_HEG_123.fits`: HEG events assigned to orders 1,2 and 3.
- `1010_HEG_all.fits`: all HEG events.
- `1010_MEG_123.fits`: MEG events assigned to orders 1,2 and 3.
- `1010_MEG_all.fits`: all MEG events.

Examine the Results

To view the images, load them into ds9 in pairs:

```
unix% ds9 1010_HEG_123.fits 1010_HEG_all.fits −tile mode row &
```

as shown in Figure 1; the ds9 command−line option "tile" was used to display the images top−to−bottom. The images show the density of events; there will usually be a dense event region at order = 1. The x−axis is order times wavelength determined from distance to the source. The y−axis is order determined from chip energy and distance from the source.

Loading the MEG images into ds9 instead creates Figure 2. Notice that most of the flux in each of the `123.fits` images is contained in horizontal regions.

For comparison, look at this figure of the HEG images created when the zero−order source was incorrectly identified. The poor source location is evident in the curve of the regions of high count density. They would meet in the center if the source was properly identified, as shown in the previous two figures.

History

03 Jan 2005	updated for CIAO 3.2: new version of `tg_osort_img` script
12 Dec 2005	updated for CIAO 3.3: version 0.7 of `tg_scale_reg.sl`
01 Dec 2006	reviewed for CIAO 3.4: no changes

URL: http://cxc.harvard.edu/ciao/threads/osort_image/ Last modified: 1 Dec 2006

Image 1: HEG order−sorting plots

1010_HEG_123.fits is in the top frame and 1010_HEG_all.fits is in the bottom frame.

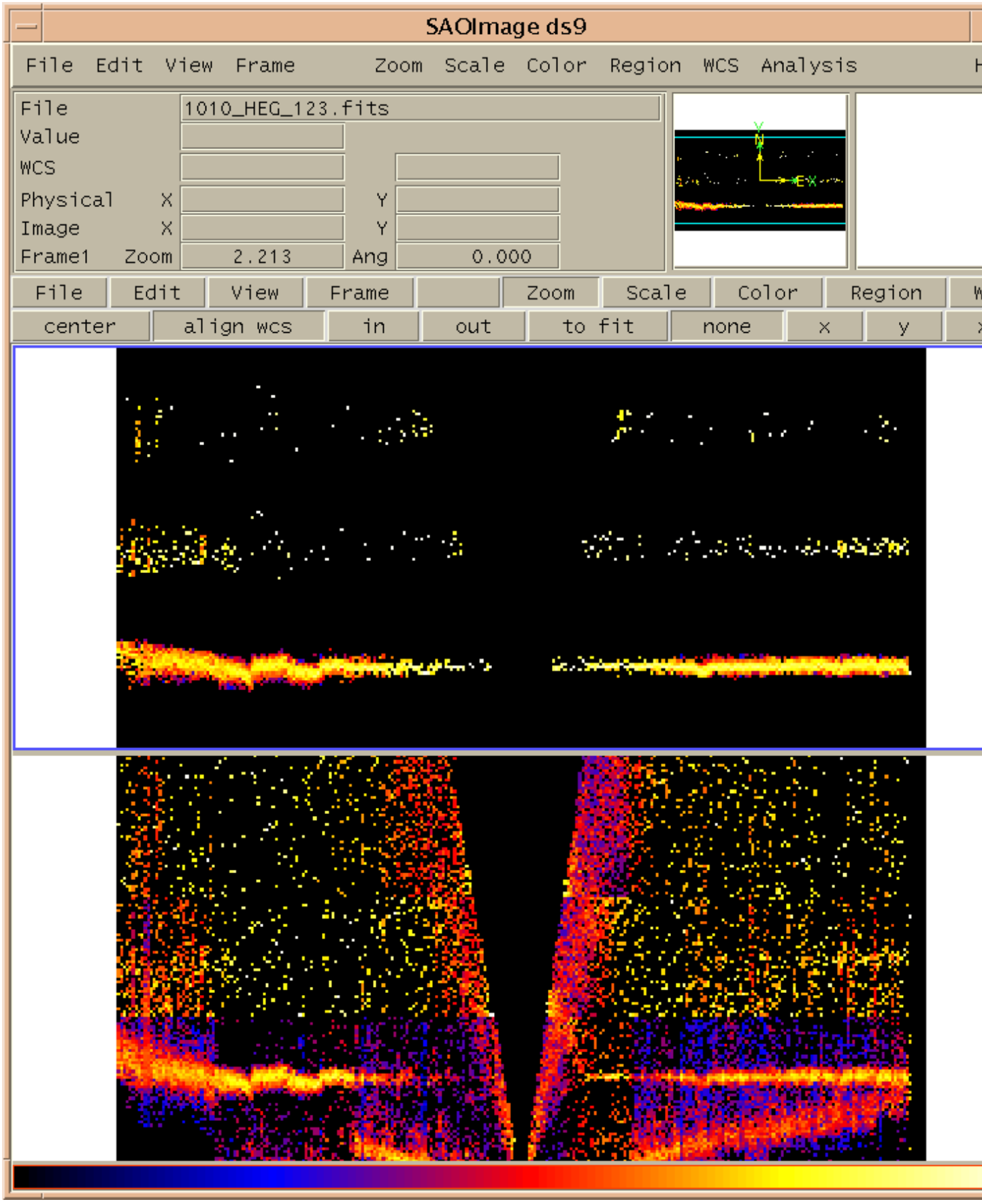

Image 1: HEG order−sorting plots

Image 2: MEG order−sorting plots

1010_MEG_123.fits is in the top frame and 1010_MEG_all.fits is in the bottom frame.

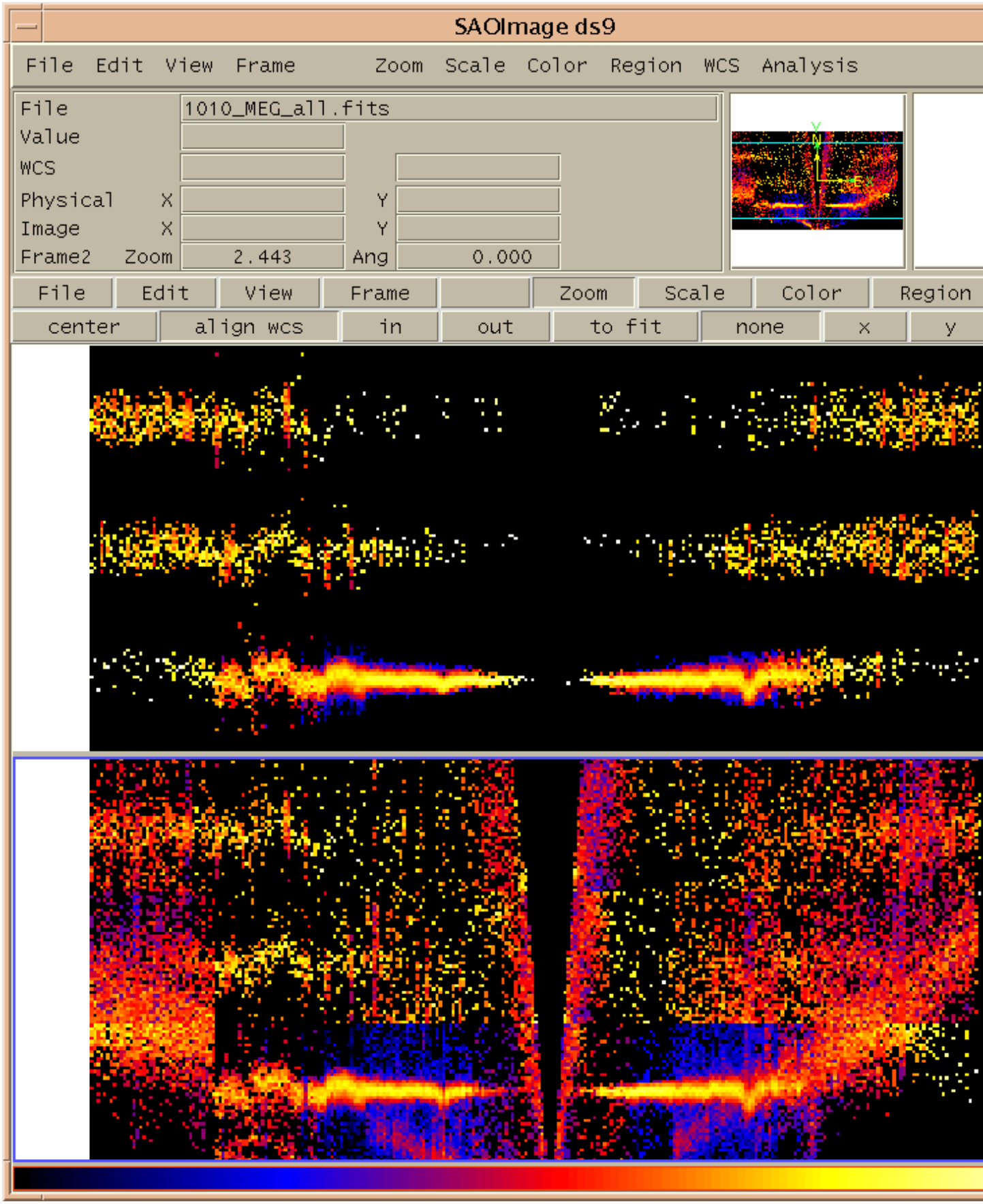

Image 2: MEG order−sorting plots
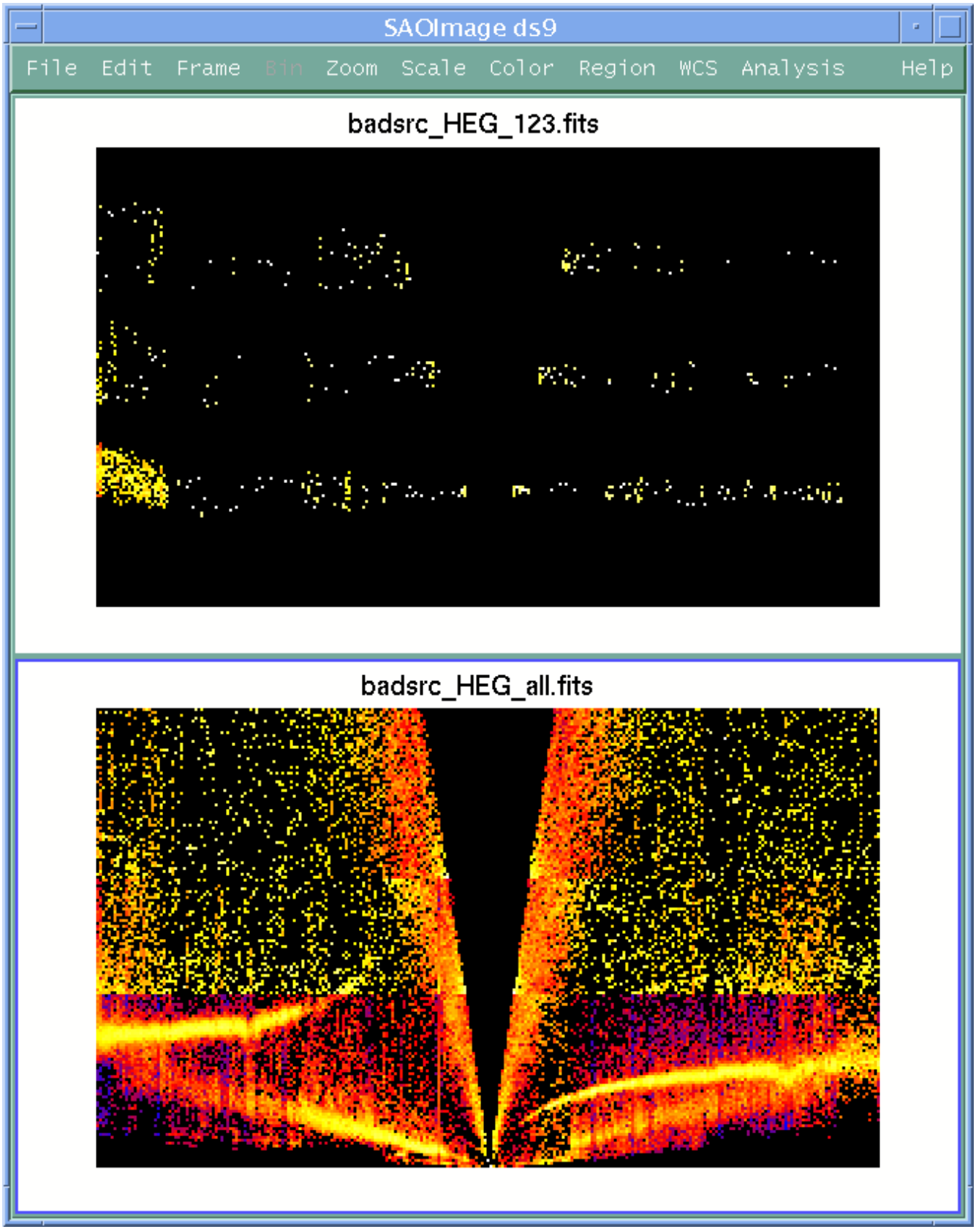
Image 3: HEG order−sorting plot with incorrect source location