

XSPEC

STEP1: Go to the High Energy Astrophysics Science Archive Research Center (HEASARC) website and download the data. <https://heasarc.gsfc.nasa.gov/cgi-bin/W3Browse/w3browse.pl>

If you follow that link, you will land on this webpage.

HEASARC Home Observatories Archive Calibration Software Tools Students/Teachers/Public

Archive HEASARC Browse Tip Archive HELP

Other Browse interfaces:
[Notification Service](#) | [Batch](#) | [Correlation](#) | [Index of All Tables](#)

Query File And Session Uploads

Start Search Reset Detailed Mission/Catalog Search

1. Do you want to search around a position ... ?
(If you want to search on parameters other than object name or coordinates, select "Detailed Mission/Catalog Search".)

Object Name or Coordinates: and/or Select Local File: No file chosen
e.g. Cyg X-1 or 12 00 00, 4 12 6 or Cyg X-2; 12.235, 15.345 (Note use of semicolons (;) to separate multiple object names and/or coordinate pairs.)

Coordinate System:

Search Radius: arcmin

Default uses the optimum radius for each catalog searched.

... and/or search by date?

Observation Dates: YYYY-MM-DD hh:mm:ss or MJD: DDDDD.ddd
Not all tables have observation dates. For those that do, the time portion of the date is optional. Times are always in UTC. Separate multiple dates/ranges with semicolons (;). Range operator is '..' (e.g. 1992-12-31; 48980.5; 1995-01-15 12:00:00; 1997-03-20 .. 2000-10-18).

2. What missions and catalogs do you want to search? (Bold text indicates mission is active)

[Most Requested Missions](#)

<input type="checkbox"/> Chandra [CXC,CSC]	<input type="checkbox"/> Fermi	<input type="checkbox"/> HaloSat	<input type="checkbox"/> Hitomi
<input type="checkbox"/> IXPE [MSFC]	<input type="checkbox"/> MAXI [JAXA]	<input type="checkbox"/> NICER	<input checked="" type="checkbox"/> NuSTAR [Caltech]
<input type="checkbox"/> ROSAT	<input type="checkbox"/> RXTE	<input type="checkbox"/> SRG/eROSITA [MPE]	<input type="checkbox"/> Suzaku
<input type="checkbox"/> Swift	<input type="checkbox"/> WMAP	<input type="checkbox"/> XMM-Newton [XSA]	<input type="checkbox"/> XRISM [JAXA]

[Other X-Ray and EUV Missions](#)

<input type="checkbox"/> Ariel V	<input type="checkbox"/> ASCA	<input type="checkbox"/> BBXRT/Astro-1	<input type="checkbox"/> BeppoSAX
<input type="checkbox"/> Cupernicus	<input type="checkbox"/> Einstein	<input type="checkbox"/> CXC/MAST	<input type="checkbox"/> EXOSAT

Enter the name of source

Click on mission

Scroll to the bottom of the page

<input type="checkbox"/> Hipparcos Main	<input type="checkbox"/> HST Guide Stars 2.3.2 	<input type="checkbox"/> NGC 2000	<input type="checkbox"/> USNO B1 
<input type="checkbox"/> 2MASS 	<input type="checkbox"/> ROSAT All-Sky Survey	<input type="checkbox"/> ROSAT Pointed Source Catalogs	<input type="checkbox"/> CGRO BATSE GRB Catalog
<input type="checkbox"/> Veron Quasars/AGN	<input type="checkbox"/> All VizieR Catalogs 	<input type="checkbox"/> XMM Serendipitous Source Catalog	
<input type="checkbox"/> Multiwavelength Catalogs			
<input type="checkbox"/> Galaxies	<input type="checkbox"/> Master	<input type="checkbox"/> Nebulae	<input type="checkbox"/> General
<input type="checkbox"/> Stars	<input type="checkbox"/> Radio		

3. What types of information do you want to search for?

- Archived data and observations
- Object catalogs
- Proposals, abstracts, and schedules

[CDS VizieR catalogs !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#) (query VizieR catalogs relevant to missions or catalogs selected above)

4. Do you want to modify the defaults for number of results and their display?

Limit Results To: rows

Output Format: Note: The FITS format requires FITS-compatible software (such as [fv](#)) to examine the results.

Show All Parameters: Select to display all catalog parameters instead of only defaults

Release notes for [Version 9.2.6](#)

[New and Updated Tables](#)

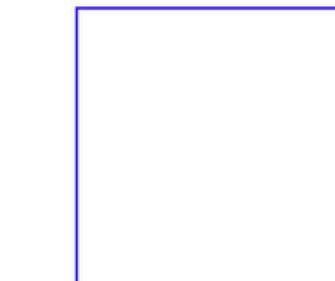
[Mission Descriptions](#)

[Browse Feedback](#)

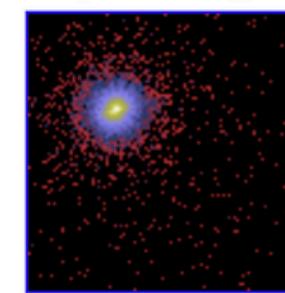
Click here to search

[Query Information](#)[Query Results](#)[Data Products Retrieval](#)[Help](#)[Processing Query...](#)

Images generated by [SkyView](#)
Click on image to see full SkyView image



[DSS](#) Optical image, 2.83'



[RASS](#) X-ray image, 75.0'

Images centered on requested position

Search was based on:

Object/Coordinates: **swift J151857.0-572147**
resolved by SIMBAD (local cache) to [15 18 57.50, -57 21 48.7]

Using the coordinates from the SIMBAD resolver for swift J151857.0-572147.

Coord. System: Equatorial, equinox 2000

Maximum Rows: 1000

Search Radius: Default arc minutes

[Reissue Query](#)

[Save Query to File](#)

[Redisplay](#) as [HTML Table](#)

[Printer-Friendly Version](#)

[Save All Objects To File](#)

[Reset](#)

Browse Tip: Do you know how to estimate the number of random matches in a cross-correlation? [Learn more on this topic](#) or [See all tips](#)

Table Name/Row Count Summary: [Querying table 2 out of 7.](#)

Click on table name to view search results

[Click here to get list of observation IDs](#)

numaster:NuSTAR Master Catalog	4 nuecdfscat:NuSTAR Survey of Extended Chandra Deep Field South (ECDF-S) Source Catalog
nustarssc2:NuSTAR Serendipitous Survey 40-Month Secondary Source Catalog	nustarssc:NuSTAR Serendipitous Survey 40-Month Primary Source Catalog
nugalcen:NuSTAR Hard X-Ray Survey of the Galactic Center	nucosmosfc:NuSTAR COSMOS Field X-Ray Source Catalog
nuaftl:NuSTAR As-Flown Timeline	

Click mission tabs (middle tab level) to display table tabs. Move cursor over tabs to see more information.

Table Legend:

🔍 Display all parameters for a row

⬇ Sort by a column in order: 1,2,3 ⬆ Sort by column in reverse order: 3,2,1 ⬇/⬆ Current table sort

Services Links: O: Digitized Sky Survey image, R: ROSAT All-Sky Survey image, N: NED objects near coordinates,
S: SIMBAD objects near coordinates, D: get list of data products, B: ADS bibliography holdings

Data Products: Click checkbox to add row to Data Products Retrieval List

[NuSTAR Master Catalog \(numaster\)](#) [Bulletin](#)

Search radius used: 12.00'

Click on atleast one of the observation ID

Select	Services	name	ra	dec	time	obsid	status	exposure a [s]	observation mode	obs type	processing date	public date	issue flag	Search Offset [']
<input type="checkbox"/> All	O R N S D B	MAXI_J1820p070	18 20 18.2	+07 08 59	2018-10-29 01:11:08	90401309039	archived	58254	SCIENCE	TOO	2020-08-01 21:36:00	2018-11-09 0		2.335 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 17.4	+07 09 31	2019-09-20 19:16:11	90501337004	archived	47617	SCIENCE	TOO	2020-07-22 12:00:00	2019-10-03 0		1.966 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 16.2	+07 09 14	2019-08-26 07:16:11	90501337002	archived	44581	SCIENCE	TOO	2020-07-23 04:48:00	2019-09-16 0		2.366 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 22.3	+07 13 11	2019-05-01 09:36:09	90501320002	archived	42643	SCIENCE	TOO	2020-07-25 19:12:00	2019-05-17 0		2.062 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 18.5	+07 08 43	2018-10-13 22:46:08	90401309037	archived	38469	SCIENCE	TOO	2020-08-03 19:12:00	2018-10-18 0		2.550 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 26.8	+07 13 05	2019-03-25 19:51:10	90501311002	archived	28664	SCIENCE	TOO	2020-09-11 04:48:00	2019-04-05 0		2.309 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 18.5	+07 09 15	2018-09-27 21:51:07	90401309033	archived	24895	SCIENCE	TOO	2020-08-04 07:12:00	2018-10-04 0		2.049 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 11.2	+07 12 02	2018-06-28 03:56:10	90401309021	archived	21868	SCIENCE	TOO	2020-08-12 04:48:00	2018-07-07 0		2.821 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 12.6	+07 09 37	2018-07-28 01:11:08	90401309027	archived	20634	SCIENCE	TOO	2020-09-10 21:36:00	2018-08-18 1		2.754 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 20.0	+07 09 20	2018-10-06 07:11:08	90401309035	archived	18572	SCIENCE	TOO	2020-08-04 00:00:00	2018-10-18 0		1.853 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 14.1	+07 09 21	2018-08-19 07:26:07	90401309031	archived	18502	SCIENCE	TOO	2020-08-11 00:00:00	2018-09-08 0		2.634 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 21.1	+07 12 45	2018-05-03 18:51:07	90401309016	archived	13791	SCIENCE	TOO	2020-08-13 12:00:00	2018-05-12 1		1.635 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 26.1	+07 13 00	2018-04-04 04:31:09	90401309012	archived	12333	SCIENCE	TOO	2020-08-14 09:36:00	2018-04-19 0		2.140 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 26.6	+07 12 16	2018-03-14 20:26:10	90401309002	archived	11768	SCIENCE	TOO	2020-08-15 14:24:00	2018-03-20 1		1.619 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 19.7	+07 12 35	2018-05-17 14:26:10	90401309019	archived	9444	SCIENCE	TOO	2020-08-13 04:48:00	2018-05-25 1		1.563 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 25.0	+07 13 06	2018-04-17 06:31:06	90401309014	archived	9208	SCIENCE	TOO	2020-08-14 02:24:00	2018-04-27 1		2.114 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 13.2	+07 09 35	2018-08-13 14:26:10	90401309029	archived	8708	SCIENCE	TOO	2020-08-11 07:12:00	2018-08-25 0		2.646 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 13.0	+07 10 25	2018-07-15 17:51:13	90401309025	archived	8053	SCIENCE	TOO	2020-08-11 21:36:00	2018-07-28 0		2.333 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 09.7	+07 11 31	2018-07-07 08:36:06	90401309023	archived	7269	SCIENCE	TOO	2020-08-12 00:00:00	2018-07-21 1		3.064 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 20.1	+07 13 16	2018-05-21 05:51:13	90401324002	archived	6570	SCIENCE	TOO	2020-08-13 02:24:00	2018-05-25 0		2.186 (maxi j1820+070)
<input checked="" type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 26.5	+07 12 35	2018-02-21 07:06:06	90401309006	archived	4520	SCIENCE	TOO	2020-08-15 09:36:00	2018-04-02 0		1.842 (maxi j1820+070)

Scroll down to the bottom of the page

<input type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 26.6	+07 12 16	2018-03-14 20:26:10	90401309002	archived	11768	SCIENCE	TOO	2020-08-15 14:24:00	2018-03-20	1	1.619 (maxi j1820+070)						
<input type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 19.7	+07 12 35	2018-05-17 14:26:10	90401309019	archived	9444	SCIENCE	TOO	2020-08-13 04:48:00	2018-05-25	1	1.563 (maxi j1820+070)						
<input type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 25.0	+07 13 06	2018-04-17 06:31:06	90401309014	archived	9208	SCIENCE	TOO	2020-08-14 02:24:00	2018-04-27	1	2.114 (maxi j1820+070)						
<input type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 13.2	+07 09 35	2018-08-13 14:26:10	90401309029	archived	8708	SCIENCE	TOO	2020-08-11 07:12:00	2018-08-25	0	2.646 (maxi j1820+070)						
<input type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 13.0	+07 10 25	2018-07-15 17:51:13	90401309025	archived	8053	SCIENCE	TOO	2020-08-11 21:36:00	2018-07-28	0	2.333 (maxi j1820+070)						
<input type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 09.7	+07 11 31	2018-07-07 08:36:06	90401309023	archived	7269	SCIENCE	TOO	2020-08-12 00:00:00	2018-07-21	1	3.064 (maxi j1820+070)						
<input type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 20.1	+07 13 16	2018-05-21 05:51:13	90401324002	archived	6570	SCIENCE	TOO	2020-08-13 02:24:00	2018-05-25	0	2.186 (maxi j1820+070)						
<input type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 26.5	+07 12 35	2018-03-21 07:06:06	90401309006	archived	4539	SCIENCE	TOO	2020-08-15 09:36:00	2018-04-02	0	1.842 (maxi j1820+070)						
<input type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 27.9	+07 13 02	2018-03-24 12:31:06	90401309008	archived	3046	SCIENCE	TOO	2020-08-15 07:12:00	2018-04-02	0	2.417 (maxi j1820+070)						
<input type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 25.6	+07 12 29	2018-03-21 00:31:06	90401309004	archived	2761	SCIENCE	TOO	2020-08-15 12:00:00	2018-04-02	1	1.631 (maxi j1820+070)						
<input type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 20.4	+07 12 37	2018-05-17 03:36:09	90401309018	archived	2733	SCIENCE	TOO	2020-08-13 07:12:00	2018-05-25	0	1.545 (maxi j1820+070)						
<input type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 27.4	+07 12 46	2018-03-24 20:26:10	90401309010	archived	2660	SCIENCE	TOO	2020-08-15 07:12:00	2018-04-02	1	2.130 (maxi j1820+070)						
Select	Services		name	ra	dec	time	obsid	status	exposure a	observation mode	obs type	processing date	public date	issue flag	Search Offset					
<input type="checkbox"/>	All																			
<input type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 23.5	+07 13 10	2018-04-16 22:21:13	90401309013	archived	1834	SCIENCE	TOO	2020-08-14 02:24:00	2018-04-27	0	2.078 (maxi j1820+070)						
<input type="checkbox"/>	O R N S D B	MAXI_J1820p070	18 20 13.4	+07 09 31	2018-07-28 00:46:13	90401309026	archived	246	SCIENCE	TOO	2020-08-11 14:24:00	2018-08-18	0	2.660 (maxi j1820+070)						

27 rows retrieved from numaster

Data Products Retrieval:

- Select the checkboxes for the rows of interest above,
- Un-check any data products below you are not interested in
- Select the Data Products Retrieval tab for retrieval options

Data Products available for numaster:

All

NuSTAR Observation (nustar.obs)

Auxiliary Data (nustar.obs.aux)

Quicklook Data (nustar.obs.evt.ql)

Basic Science Data (nustar.obs.evt.sci)

Housekeeping Data (nustar.obs.hk)

Observation and Processing Logs (nustar.obs.logs)

Unfiltered and Cleaned Data (nustar.obs.sci)

[Retrieve Data Products for selected rows](#)

Further Actions:

Do you want to [Cross-correlate](#) your numaster results with another catalog or table? ([help](#))

[Browse Feedback](#)

Click here to retrieve the data product

[Query Information](#) [Query Results](#) [Data Products Retrieval](#) [Help](#)

Data Products Download Options and Other Services

[Click here to get TAR file](#)

Data Products Download Options

- [Create Download Script](#) for data products for selected rows
- [Preview and Retrieve](#) data products for selected rows
- [Retrieve](#) data products for selected rows
- [Save to Hera](#) data products for selected rows
- [What is Hera?](#)

Optionally, add a file name constraint to specify product types,
e.g., `*/hri/*.gif` Use a semicolon (;) for multiple constraints, e.g., `*fits*;*gif*`

[File name filter](#)

Other Services for Selected Rows

- [Display](#) all the columns for selected rows

Web-based services for selected rows

- NED
- SIMBAD
- SkyView:ROSAT All-Sky
- SkyView:DSS
- CoCo

[GO](#)

[Click to view selected rows and options for data product retrieval](#)

Data products that you have selected will appear below

Select all rows

NuSTAR Master Catalog

MAXI_J1820p070 18 20 18.2 +07 08 59 2018-10-29 01:11:08 90401309039 archived 58254 SCIENCE TOO 2020-08-01 21:36:00 2018-11-09 0 2.335 (maxi j1820+070)

[Browse Feedback](#)



Main Search Form

Data Products Retrieval for Selected Rows

Estimated size of TAR file: 856 MB

Your TAR file is being created now. When finished you may retrieve it via the following link:

<https://heasarc.gsfc.nasa.gov/FTP/retrieve/w3browse/w3browse-26608642.tar>.

Please wait until the "TAR complete" message appears below before retrieving.

Below are data products included in the TAR file: (file names ending in '.gz' or '.Z' have been compressed for faster download)

Tarred: /FTP/nustar/data/obs/04/9//90401309039

TAR complete: Actual size: 856 MB.

Remote files are not included in the tar file. Use the **Create Download Script** option to retrieve remote files.

[HEASARC Browse](#) is a service provided by the Astrophysics Science Division at NASA/Goddard Space Flight Center. If using this service made a significant contribution to a research project, please make the following acknowledgment in any resulting publication:

"This research has made use of data obtained through the High Energy Astrophysics Science Archive Research Center online service, provided by the NASA/Goddard Space Flight Center."

[Browse Feedback](#)

Recent download history

w3browse-26608642.tar
↓ 33.2/856 MB • 2 hours left

index (1).html
14.2 KB • 23 hours ago

[Full download history](#)

[Click Here to start download](#)

XSPEC

STEP1: Go to the High Energy Astrophysics Science Archive Research Center (HEASARC) website and download the data. <https://heasarc.gsfc.nasa.gov/cgi-bin/W3Browse/w3browse.pl>

STEP2: Processing the downloaded NUSTAR data using the standard **nupipeline** task in HEASoft with the latest CALDB, producing cleaned and calibrated Level 2 event files.

Command: `nupipeline indir=./90401309039 steminputs=nu90401309039 outdir=./out90401309039`

It may take **20 mins to 1hr** depending upon your computer's Processing speed. After successful completion it will **exit with success**.

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STEP1: Go to the High Energy Astrophysics Science Archive Research Center (HEASARC) website and download the data. <https://heasarc.gsfc.nasa.gov/cgi-bin/W3Browse/w3browse.pl>

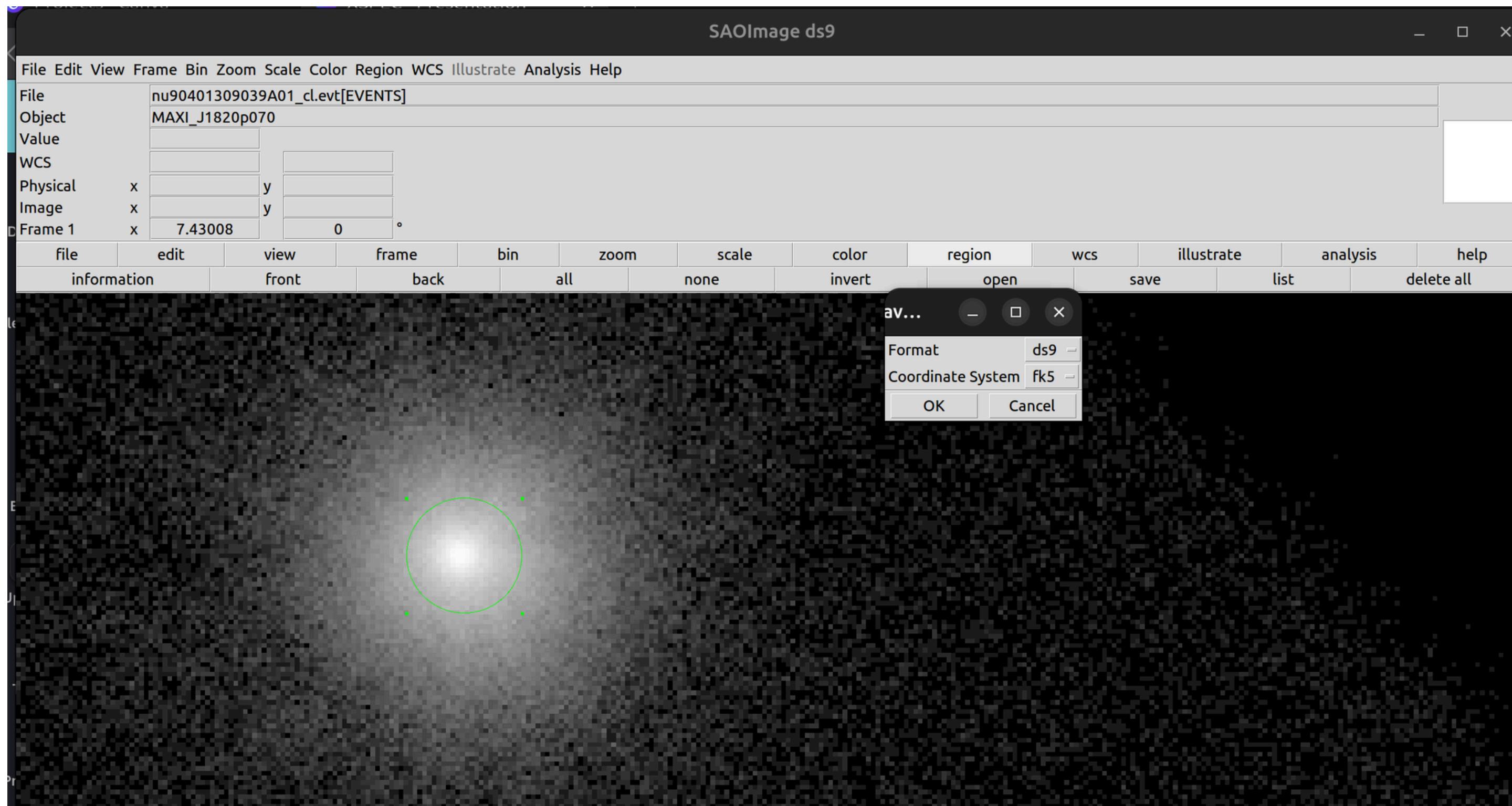
STEP2: Processing the downloaded NUSTAR data using the standard **nupipeline** task in HEASoft with the latest CALDB, producing cleaned and calibrated Level 2 event files.

STEP3: Extracting the source and background regions using **SAOImage DS9**

Open event file in DS9 using command: `ds9 out90401309039/nu90401309039A01_cl.evt`

Select 60 arc sec region circle at the centre of the source and on a dark background. Save each region as `src.reg` and `bkg.reg`.

Note: Set the Coordinate system to WCS



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STEP1: Go to the High Energy Astrophysics Science Archive Research Center (HEASARC) website and download the data. <https://heasarc.gsfc.nasa.gov/cgi-bin/W3Browse/w3browse.pl>

STEP2: Processing the downloaded NUSTAR data using the standard **nupipeline** task in HEASoft with the latest CALDB, producing cleaned and calibrated Level 2 event files.

STEP3: Extracting the source and background regions using **SAOImage DS9**

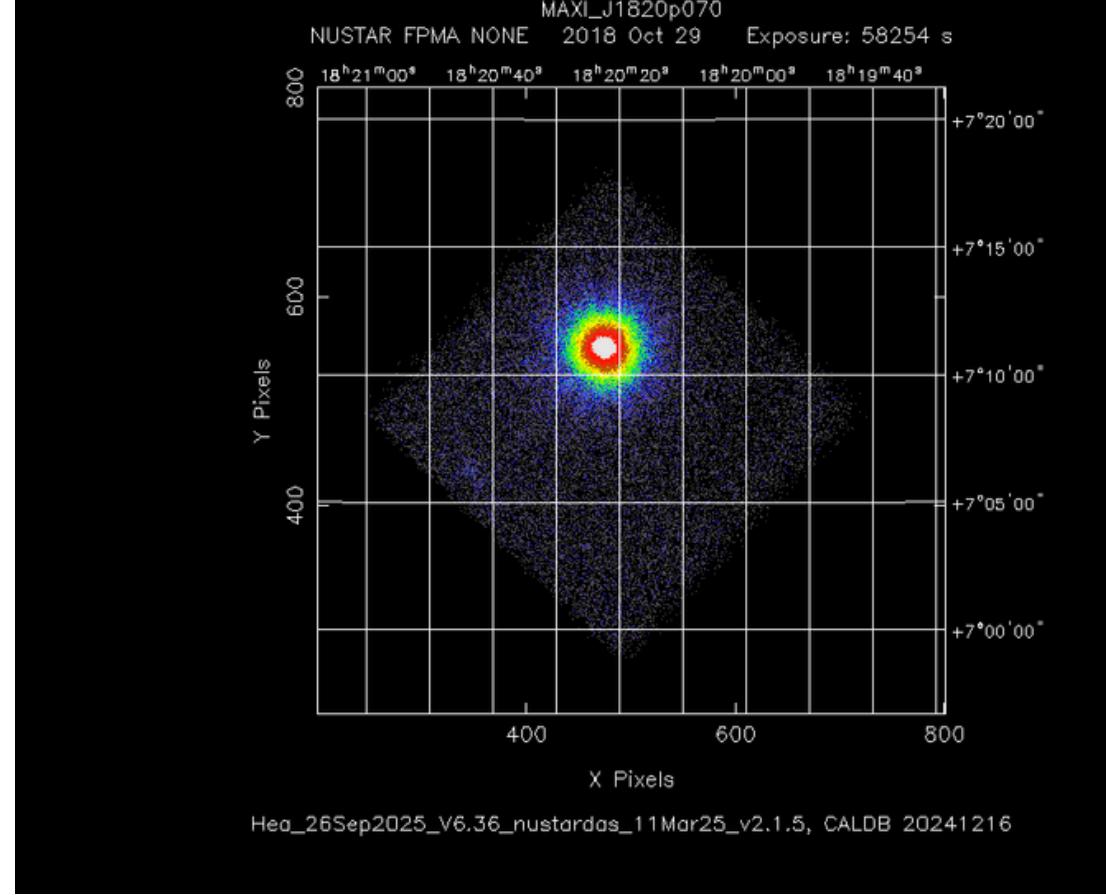
STEP4: Extracting Source and background spectra, light curves, and instrumental response files (RMF and ARF) were obtained using **nuproducts** in heasoft.

Command: *nuproducts srcregionfile=src.reg bkgregionfile=bkg.reg indir=./out90401309039 outdir=./products instrument=FPMA steminputs=nu90401309039 bkgextract=yes*

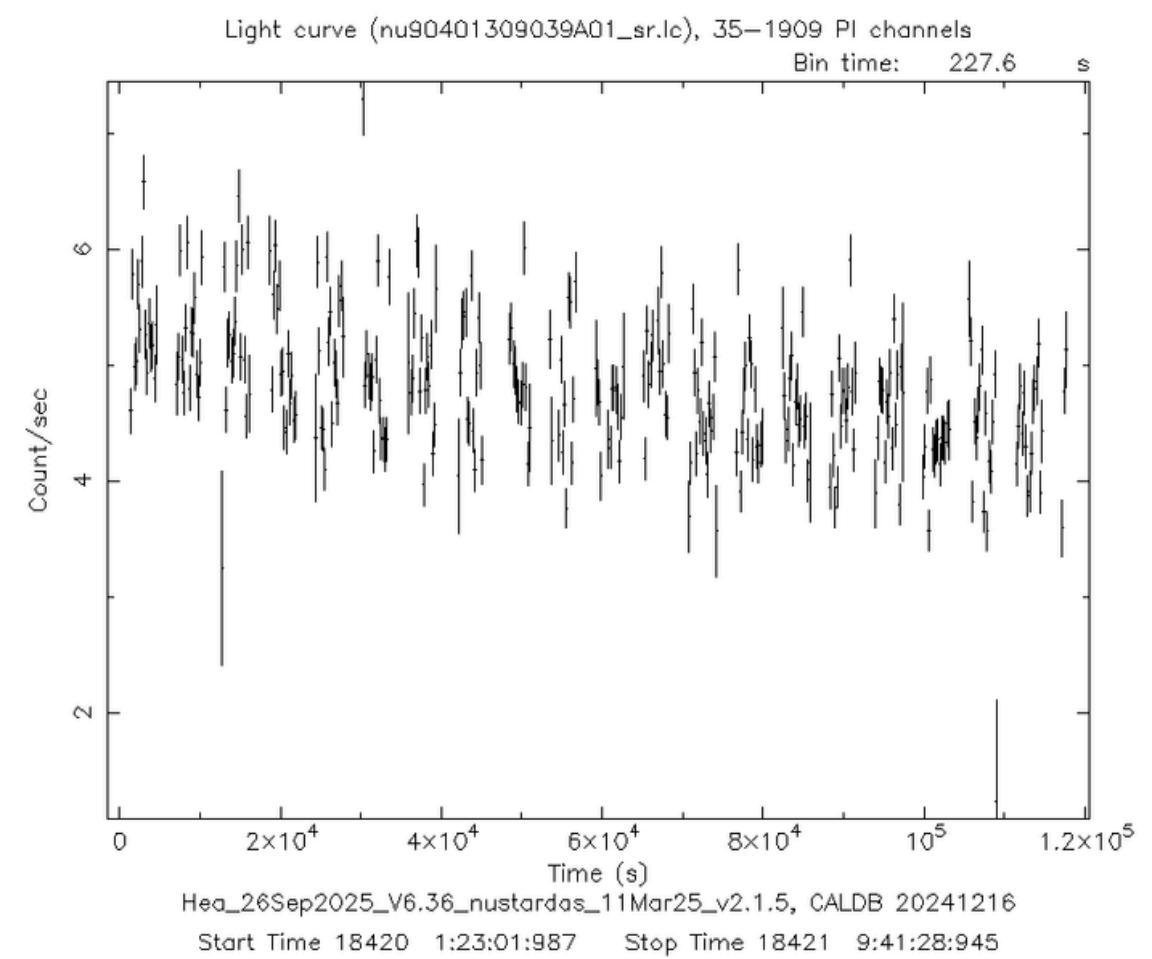
```
ramesh@Swift: ~/Downloads/BHLMXB/w3browse-26608642/out90401309039
ramesh@Swift:~/Downloads/BHLMXB/w3browse-26608642/out90401309039$ nuproducts srcregionfile=src
.reg bkgregionfile=bkg.reg indir=./ outdir=./products instrument=FPMA steminputs=nu90401309039
bkgextract=yes
nuproducts_0.3.5: Info: Running 'nuexpomap'
nuproducts_0.3.5: Command: nuexpomap clobber=no pixbin=5 alignfile=CALDB det2instrfile=./produc
cts/32134_det2map.img attfile=//nu90401309039_att.fits initseed=no instrprobmapfile=CALDB sky
x=500.5 offsetfile=NONE aberration=no teldef=CALDB percent=0.02 indet2instrfile=NONE history=y
es chatter=3 energy=10 vignflag=no infile=//nu90401309039A01_cl.evt pixposfile=CALDB aspecthi
stofile=./products/32134_asphist.fits mastaspectfile=//nu90401309039_mast.fits skyinstrfile=
./products/32134_skymap.img skyy=500.5 vignfile=CALDB skysize=1000 det1instrfile=NONE det1reffil
e=//nu90401309039A_det1.fits expomapfile=./products/32134_ex.img
-----
Running 'nuexpomap_0.2.5'
-----
© Input Parameters List:
Name of the input Event file : './nu90401309039A01_cl.evt'
Name of the input pixel location file : 'CALDB'
Name of the input Mast Aspect Solution file : './nu90401309039_mast.fits'
Name of the input Instrument Probability Map file : 'CALDB'
Name of the teldef calibration file : 'CALDB'
```

File generated by nuproducts	Format	Level 3 file description
nu9040130903A01_sk.img	FITS	Science mode image (for use in e.g. XIMAGE)
nu9040130903A01_im.gif	GIF	Science mode gif image
nu9040130903A01_sr.pha	FITS	Source energy spectrum
nu9040130903A01_ph.gif	GIF	Source energy spectrum plot
nu9040130903A01_sr_lc	FITS	Source light-curve
nu9040130903A01_lc.gif	GIF	Source light-curve plot
nu9040130903A01_bk.pha	FITS	Background energy spectrum
nu9040130903A01_bk_lc	FITS	Background light-curve
nu9040130903A01_sr.arf	FITS	Source ARF file
nu9040130903A01_sr.rmf	FITS	Source RMF file

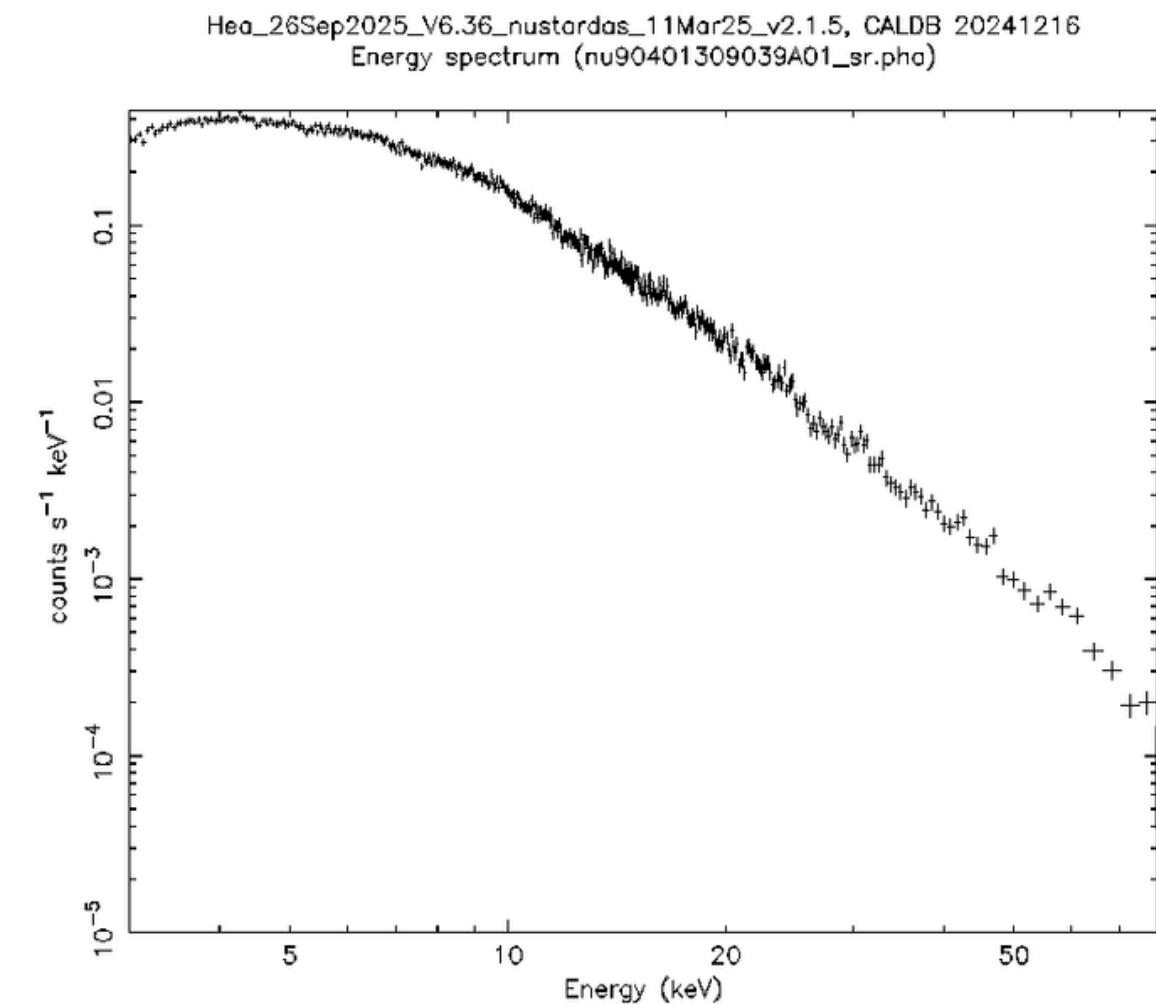
Table: nuproducts output files for FPMA



Science model image



Source light-curve



Source energy spectrum

Level 3 FPMA scientific products for Maxi J180+070 calibration observation (obsID 9040130903)

XSPEC

STEP1: Go to the High Energy Astrophysics Science Archive Research Center (HEASARC) website and download the data. <https://heasarc.gsfc.nasa.gov/cgi-bin/W3Browse/w3browse.pl>

STEP2: Processing the downloaded NUSTAR data using the standard **nupipeline** task in HEASoft with the latest CALDB, producing cleaned and calibrated Level 2 event files.

STEP3: Extracting the source and background regions using **SAOImage DS9**

STEP4: Extracting Source and background spectra, light curves, and instrumental response files (RMF and ARF) were obtained using **nuproducts** in heasoft.

STEP5: Loading spectra into **XSPEC** and fitting with a power law.

1. Run XSPEC with command: `xspec`

```
ramesh@Swift:~/Downloads/BHLMXB/w3browse-26608642/out90401309039$ xspec
```

```
        XSPEC version: 12.15.1  
Build Date/Time: Sun Nov  2 08:17:13 2025
```

```
XSPEC12>
```

2. Load data into XSPEC with the command: `data nu90401309039A01_sr.pha`

```
XSPEC12>data nu90401309039A01_sr.pha  
Warning: RMF DETNAM keyword (DET0) is not consistent with that in spectrum (NONE)
```

```
1 spectrum in use
```

```
Spectral Data File: nu90401309039A01_sr.pha Spectrum 1  
Net count rate (cts/s) for Spectrum:1 3.038e+00 +/- 7.260e-03 (99.5 % total)
```

```
Assigned to Data Group 1 and Plot Group 1
```

```
Noticed Channels: 1-4096
```

```
Telescope: NuSTAR Instrument: FPMA Channel Type: PI
```

```
Exposure Time: 5.825e+04 sec
```

```
Using fit statistic: chi
```

```
Using Background File nu90401309039A01_bk.pha
```

```
Background Exposure Time: 5.825e+04 sec
```

```
Using Response (RMF) File nu90401309039A01_sr.rmf for Source 1
```

```
Using Auxiliary Response (ARF) File nu90401309039A01_sr.arf
```

```
XSPEC12>
```

3. Ignore spectral bins flagged as bad (typically, at low/high E) with the command: *ignore bad*

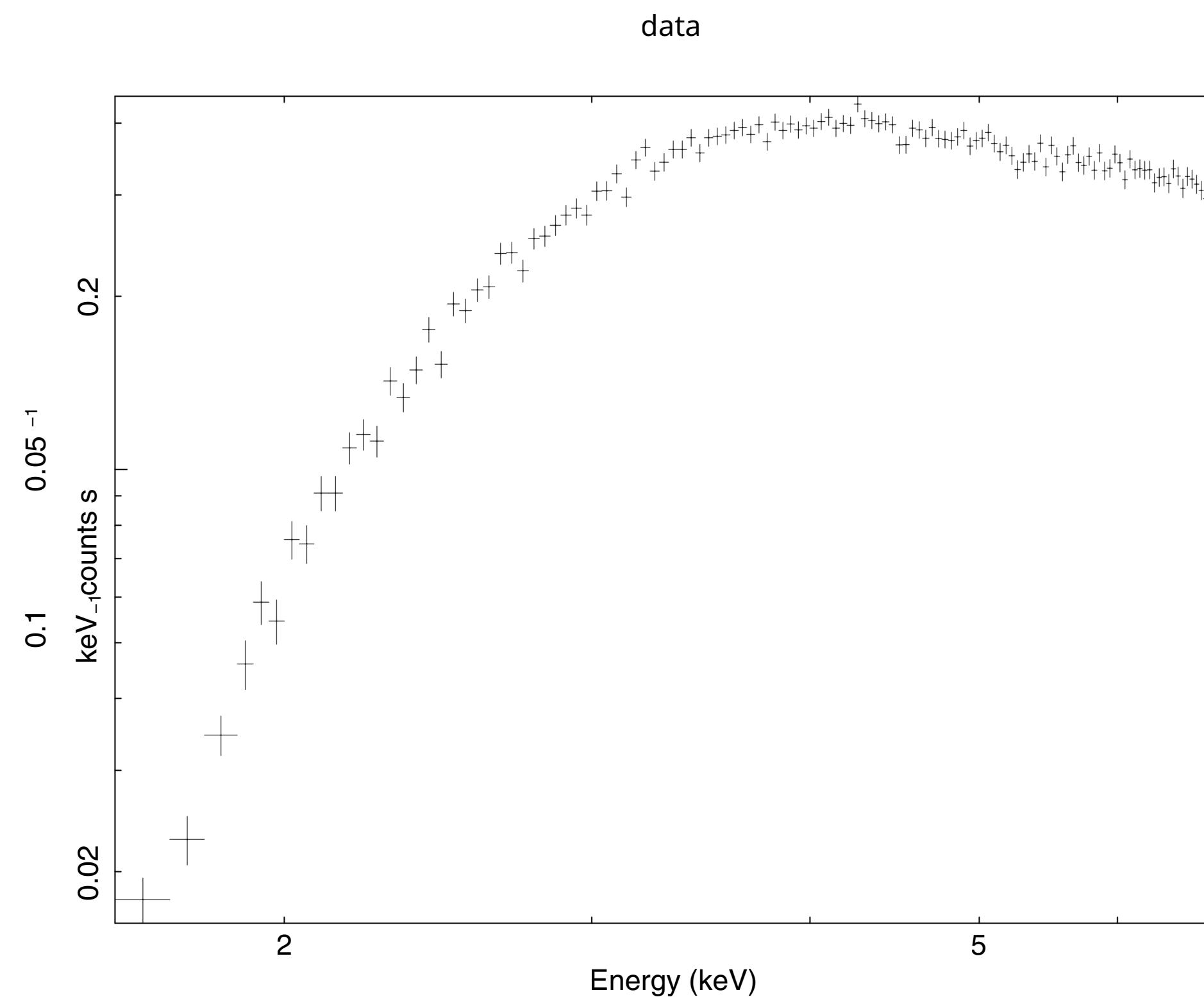
```
XSPEC12>ignore bad  
ignore:      0 channels ignored from source number 1  
XSPEC12>[ ]
```

4. ignore spectral bins below 0.3 keV and above 7 keV with the command: *ignore **-0.3 7. -***

```
XSPEC12>ignore **-0.3 7. -**  
      No channels ignored (no channels in specified range)  
      1 channels (135) ignored in spectrum #      1  
***Xspec Error: Invalid ignore/notice string: -**  
XSPEC12>[ ]
```

5. *setplot energy* → change the axis from channel to energy
6. *setplot rebin 5 12* → rebinning with minimum and maximum number of bins set to be 5 and 12.
7. *setplot command r y* → rescale the y axis
8. *cpd /xw* → changing the plotting device

8.Finally plot the data in log scale with the command: *Plot Idata*



ramesh 29-Jan-2026 08:03

9. Display a complete summary of the current XSPEC session using the command: `show all`

```
XSPEC12>show all

XSPEC version: 12.15.1

Thu Jan 29 08:08:23 2026

1 file 1 spectrum
Spectrum 1  Spectral Data File: nu90401309039A01_sr.pha
Net count rate (cts/s) for Spectrum:1  1.603e+00 +/- 5.253e-03 (99.9 % total)
Assigned to Data Group 1 and Plot Group 1
Noticed Channels: 1-134
Telescope: NuSTAR Instrument: FPMA Channel Type: PI
Exposure Time: 5.825e+04 sec
Using fit statistic: chi
Using Background File          nu90401309039A01_bk.pha
Background Exposure Time: 5.825e+04 sec
Using Response (RMF) File      nu90401309039A01_sr.rmf for Source 1
Using Auxiliary Response (ARF) File nu90401309039A01_sr.arf

Spectral data counts: 93490  Total data counts
Model predicted rate: 0.0
```

Fraction of
Src counts/Total counts

loaded back and
response files

Source net counts (i.e. background-subtracted) = data counts × fraction = $93490 \times 0.999 \rightarrow$
93396. In this case, **the source dominates the signal**

Count per bin = $93396/134 \rightarrow 697$. It has enough counts in each bin (i.e., more than 25), so
The **chi-square statistic** is applied.

Note: If the count per bin is insufficient (i.e., less than 25), then the **Cash statistics (C-stat)** should be applied.

10. Model fitting

Starting with the simple modeling

*xspec> mo pha*pho*

```
,NONE,FARSHI,Downloads,REASORT 0.505PC,XSPEC_12.1_pc_v1.0.0_XSPEC12.1.1,0.0,0.0
XSPEC12>mo pha*pho

Input parameter value, delta, min, bot, top, and max values for ...
 1 0.001( 0.01)      0      0  100000  1e+06
1:phabs:nH>5.31e-3 -1
 1 0.01( 0.01)      -3     -2      9    10
2:powerlaw:PhoIndex>1.9
 1 0.01( 0.01)      0      0  1e+20  1e+24
3:powerlaw:norm>1e-5
=====
Model phabs<1>*powerlaw<2> Source No.: 1 Active/On
Model Model Component Parameter Unit Value
par comp
 1   1   phabs    nH      10^22  5.31000E-03 frozen
 2   2   powerlaw PhoIndex          1.90000      +/- 0.0
 3   2   powerlaw norm            1.00000E-05 +/- 0.0
=====
Fit statistic : Chi-Squared           93042.60      using 134 bins.
Test statistic : Chi-Squared          93042.60      using 134 bins.
Null hypothesis probability of 0.00e+00 with 132 degrees of freedom
Current data and model not fit yet.
```

pha: accounts for Galactic nH

po: powerlaw model for the primary AGN comp.

nH is the hydrogen column density, which quantifies the amount of interstellar absorption affecting the X-ray spectrum

You can find nH by using *nh* command

11. Fit using the command: *fit 100*

```
=====
Model phabs<1>*powerlaw<2> Source No.: 1 Active/On
Model Model Component Parameter Unit      Value
par   comp
 1    1    phabs      nH          10^22    5.31000E-03 frozen
 2    2    powerlaw   PhoIndex
 3    2    powerlaw   norm       3.80886E-02 +/- 6.98332E-04
-----
Fit statistic : Chi-Squared           658.03      using 134 bins.
Test statistic : Chi-Squared         658.03      using 134 bins.
Null hypothesis probability of 8.10e-71 with 132 degrees of freedom
```

χ^2/dof close to unity means that it is a good fit (here: 658/132: *not in this case!*)

All the adopted models should be physically motivated according to the known source (multi-wavelength) properties & classification

