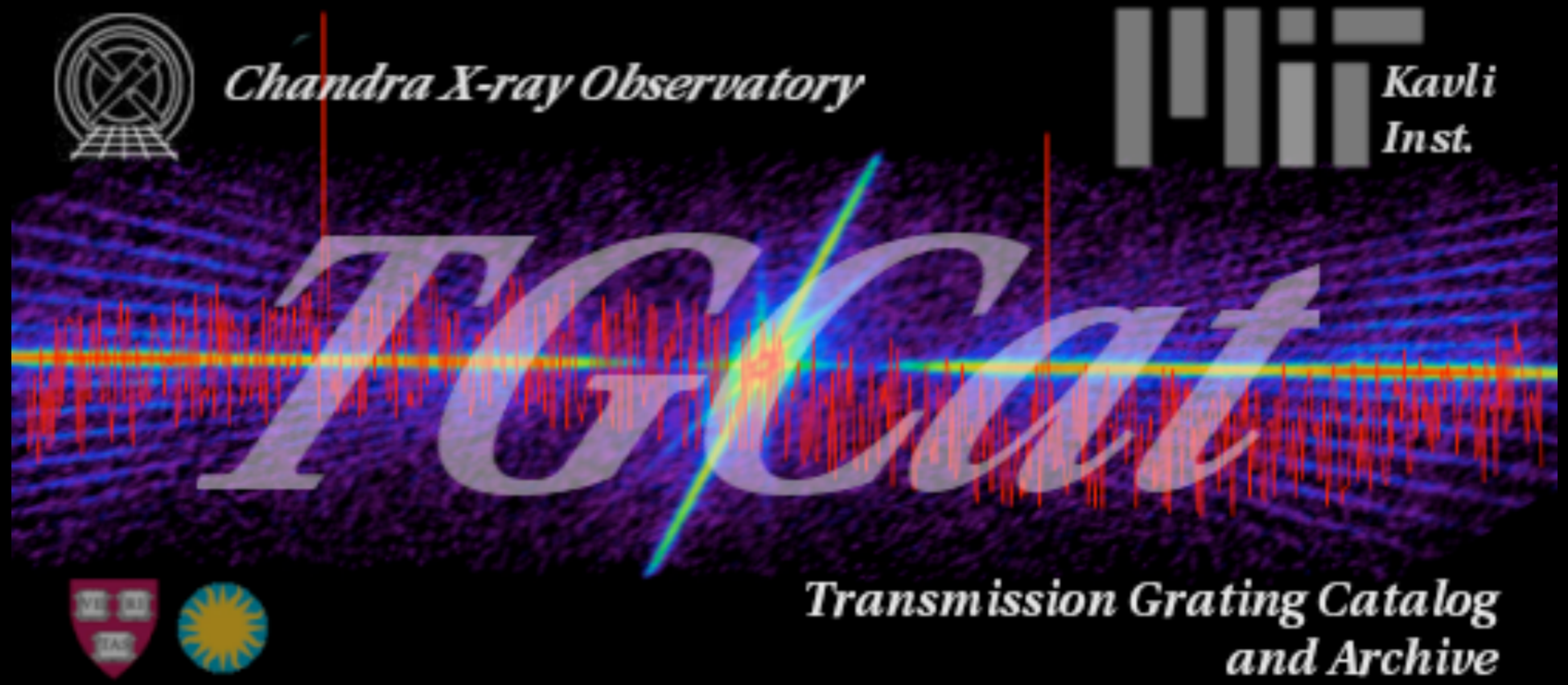
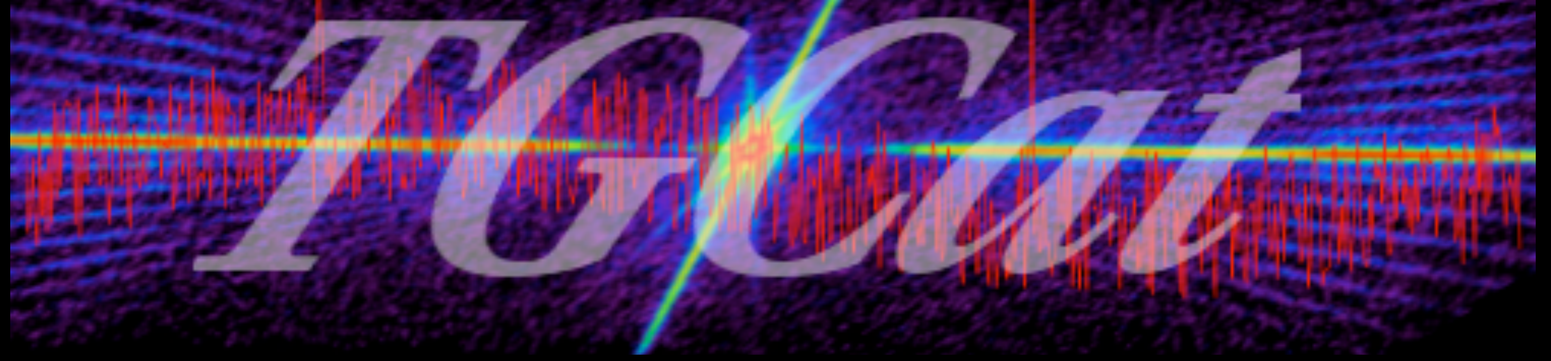


Mel Nynka

MIT Kavli Institute + Chandra X-ray Center

MIT KAVLI INSTITUTE

CHANDRA
X-RAY OBSERVATORY



Quick at-a-glance overview of Chandra Gratings observations

- Good starting point for analysis
- HETG, LETG, with ACIS or HRC detectors

1. How can you search TGCat?
2. Single Observation - search with ObsID
   - Canned analysis plots
   - Interactive plotting
3. Multiple Observations
   - Plotting variability
4. TGCat Help

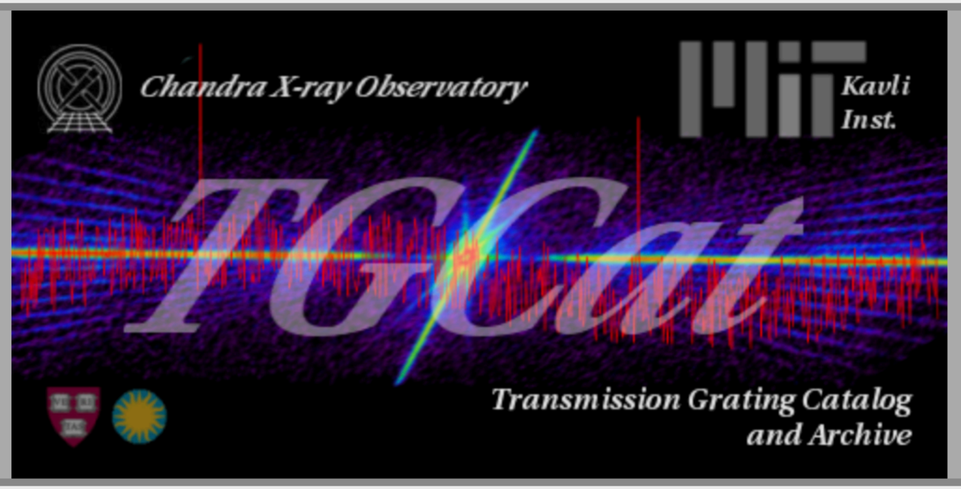
MIT KAVLI INSTITUTE

CHANDRA X-RAY OBSERVATORY

Start your (search) engines!

TGCat | Query | Quick Search | Help Topics | Help

Start Here. Select functionality from menu items



TGCat Announcements [all]

Serendipitous Source Extraction Request Form

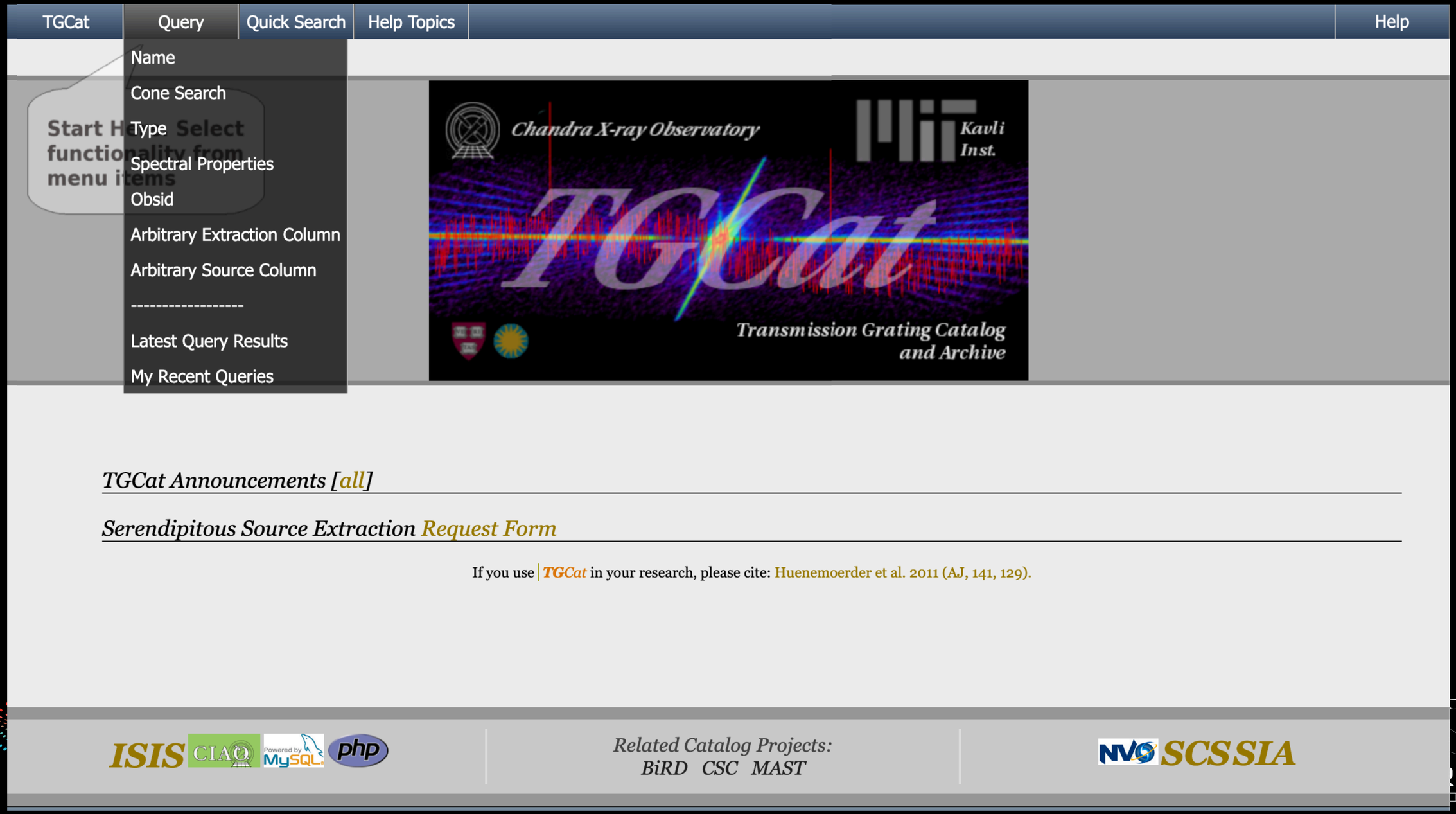
If you use | *TGCat* in your research, please cite: Huenemoerder et al. 2011 (AJ, 141, 129).

ISIS CIAO Powered by MySQL php

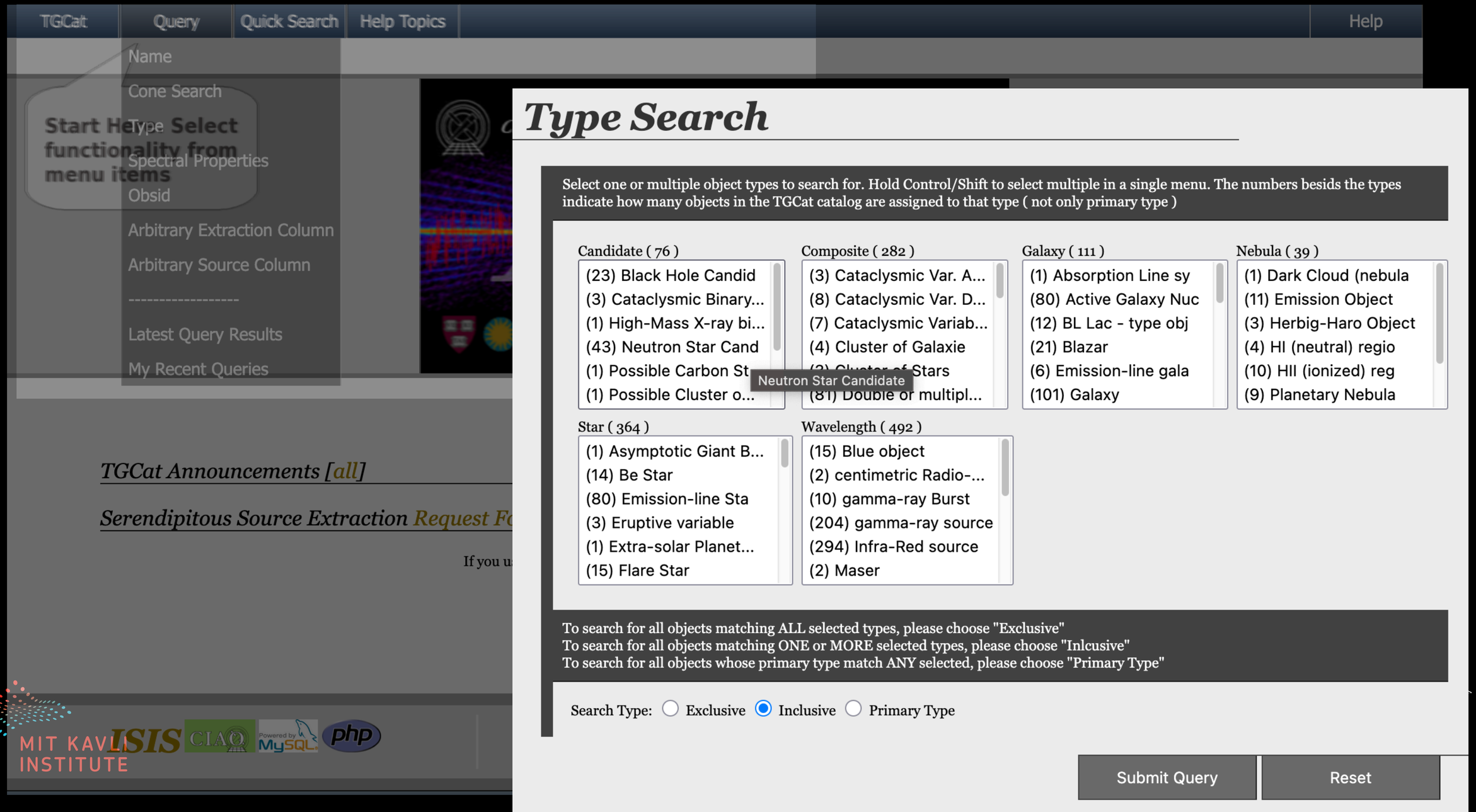
Related Catalog Projects:
BiRD CSC MAST

NVO SCS SIA

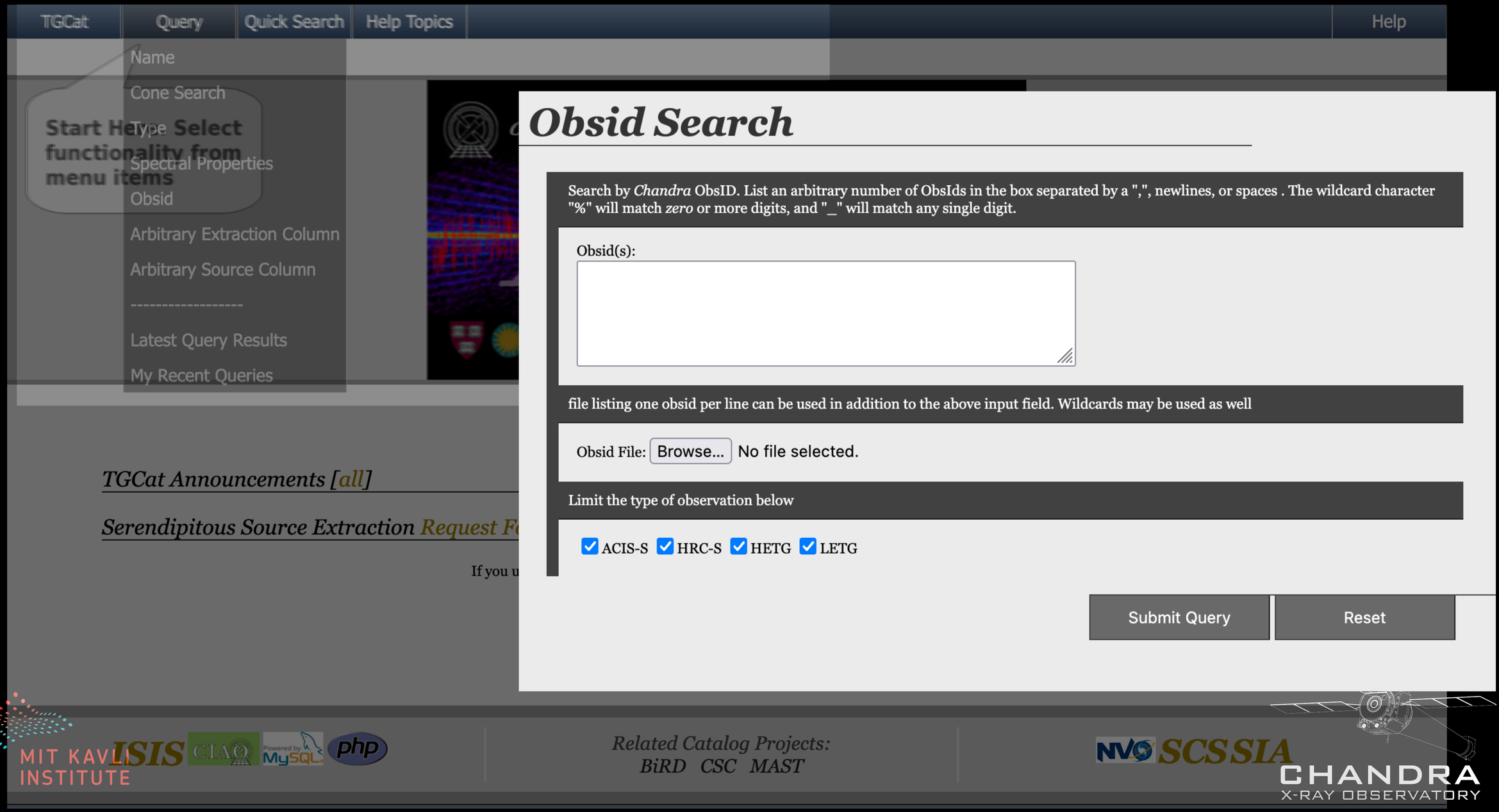
Start your (search) engines!



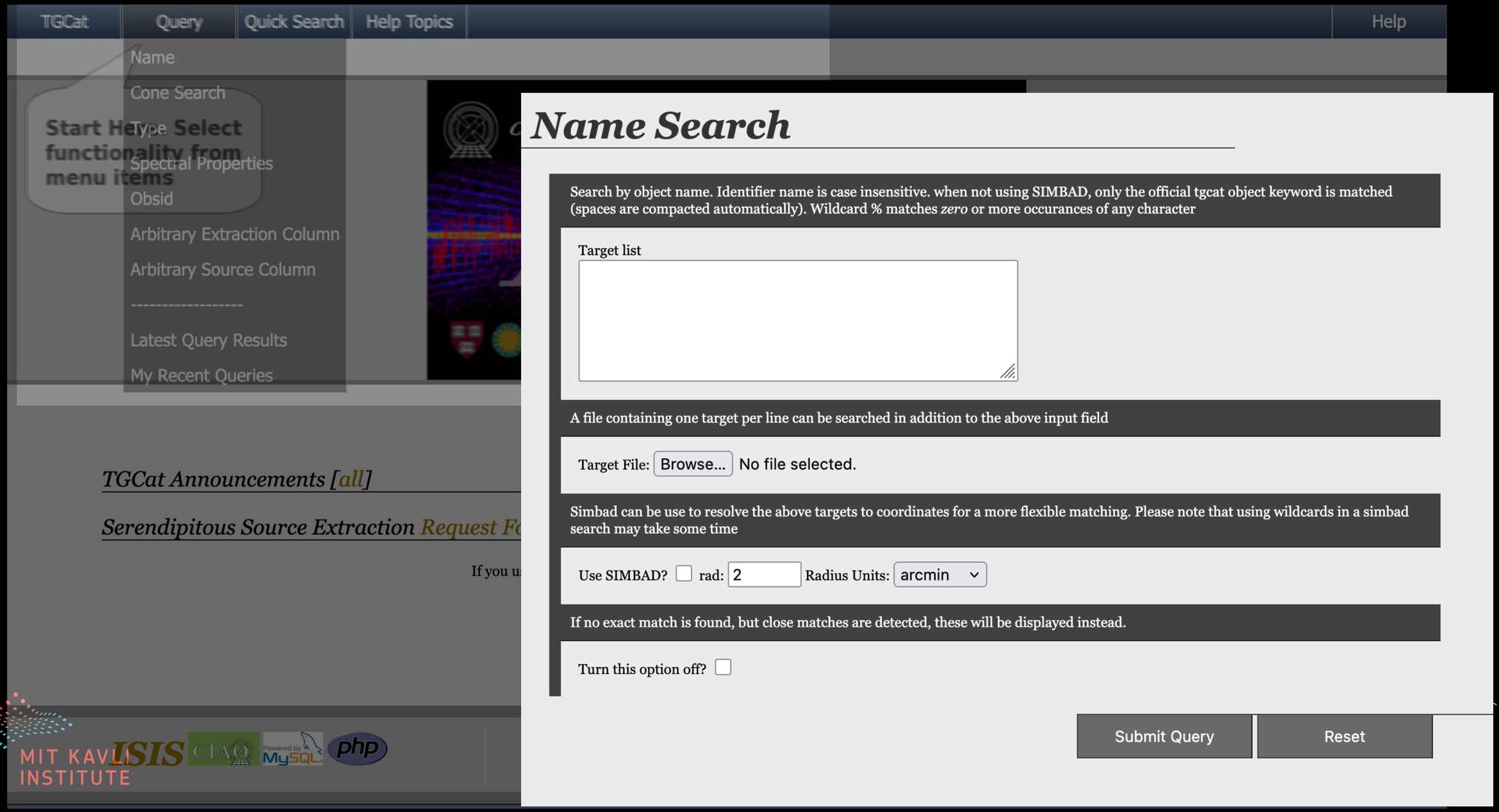
Start your (search) engines!



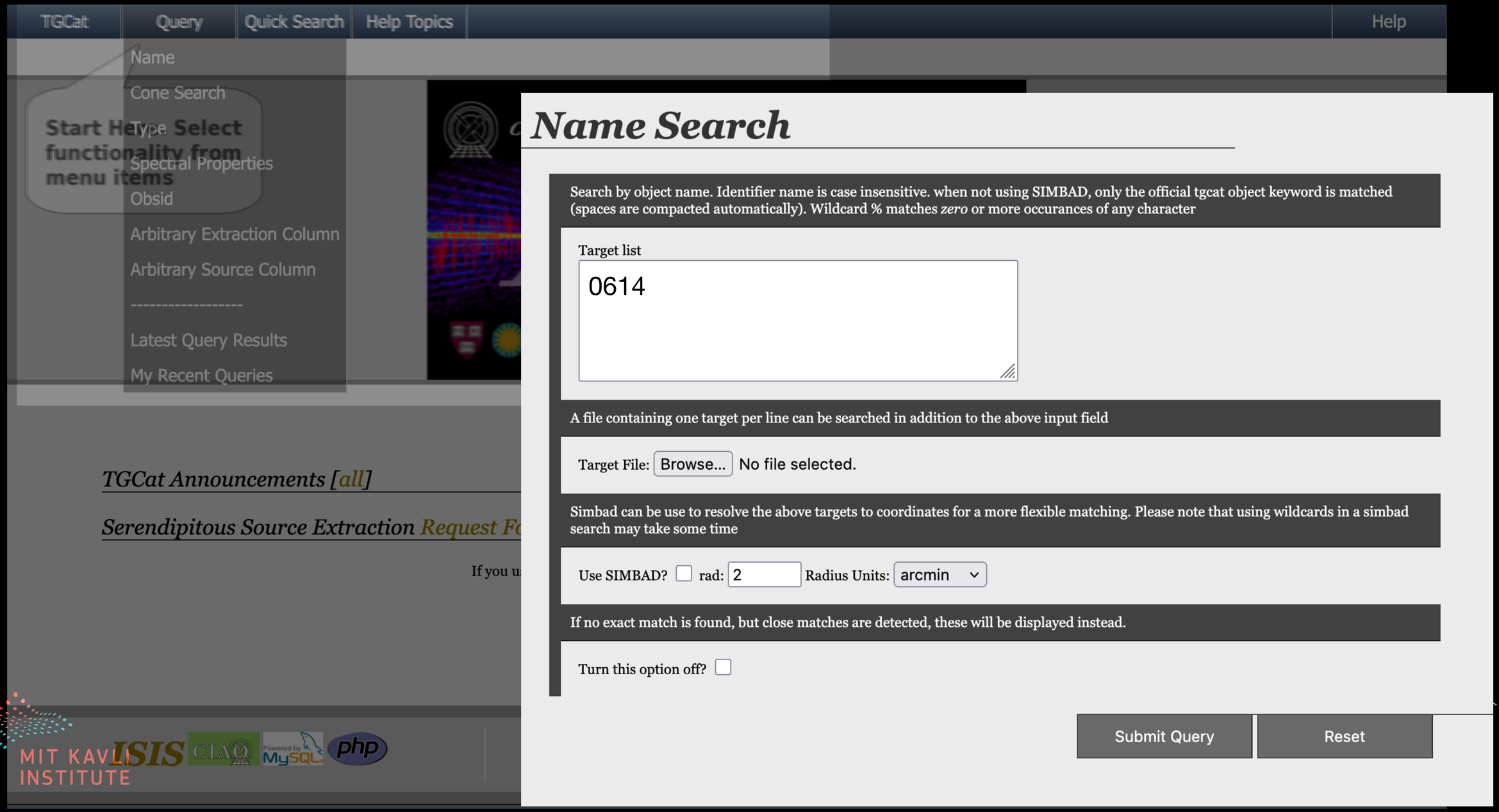
Start your (search) engines!



Start your (search) engines!



Start your (search) engines!

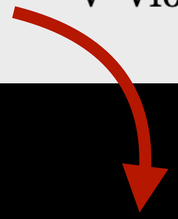


Name Search: 4U 0614+091

TGCat | Query | View | Actions | Help Topics | Help

---- currently viewing source table ----

+/-	Links	object	simbad_ID	ra (h:m:s)	decl (d:m:s)	pType	other_types	num_extractions
☐	s d b i	4U 0614+091	V* V1055 Ori	06:17:07.373	+09:08:13.524	LXB	gam, LXB, N*?, V*, X	5



TGCat | Query | View | Actions | Help Topics | Help

---- currently viewing extractions table ----

+/-	Links	obsid	object	instrument	grating	ra (h:m:s)	decl (d:m:s)	date_obs (y-m-d t)	exposure (s)
☐	o p v s	100	4U 0614+091	HRC	LETG	06:17:07.414	+09:08:13.632	1999-11-28 22:26:07	26126.1
☐	o p v s	10759	4U 0614+091	ACIS	HETG	06:17:07.363	+09:08:13.488	2009-01-24 05:07:34	59678.4
☐	o p v s	10760	4U 0614+091	ACIS	HETG	06:17:07.366	+09:08:13.524	2009-01-18 23:07:34	44687.8
☐	o p v s	10858	4U 0614+091	ACIS	HETG	06:17:07.358	+09:08:13.524	2009-01-19 17:45:01	34436.8
☐	o p v s	10857	4U 0614+091	ACIS	HETG	06:17:07.366	+09:08:13.524	2009-01-21 13:49:21	58053.2

Provides a quick snapshot of the observations

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Name Search: 4U 0614+091

TGCat | Query | View | Actions | Help Topics | Help

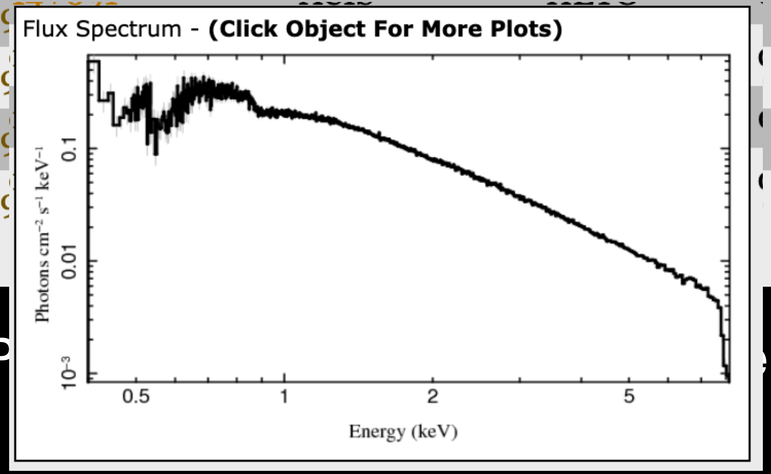
---- currently viewing source table ----

+/-	Links	object	simbad_ID	ra (h:m:s)	decl (d:m:s)	pType	other_types	num_extractions
☐	s d b i	4U 0614+091	V* V1055 Ori	06:17:07.373	+09:08:13.524	LXB	gam, LXB, N*?, V*, X	5

TGCat | Query | View | Actions | Help Topics | Help

---- currently viewing extractions table ----

+/-	Links	obsid	object	instrument	grating	ra (h:m:s)	decl (d:m:s)	date_obs (y-m-d t)	exposure (s)
☐	o p v s	100	4U 0614+091	HRC	LETG	06:17:07.414	+09:08:13.632	1999-11-28 22:26:07	26126.1
☐	o p v s	10759	4U 0614+09				+09:08:13.488	2009-01-24 05:07:34	59678.4
☐	o p v s	10760	4U 0614+09				+09:08:13.524	2009-01-18 23:07:34	44687.8
☐	o p v s	10858	4U 0614+09				+09:08:13.524	2009-01-19 17:45:01	34436.8
☐	o p v s	10857	4U 0614+09				+09:08:13.524	2009-01-21 13:49:21	58053.2



P observations

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CHANDRA X-RAY OBSERVATORY

Name Search: 4U 0614+091

TGCat | Query | View | Actions | Help Topics | Help

---- currently viewing source table ----

+/-	Links	object	simbad_ID	ra (h:m:s)	decl (d:m:s)	pType	other_types	num_extractions
☐	s d b i	4U 0614+091	V* V1055 Ori	06:17:07.373	+09:08:13.524	LXB	gam, LXB, N*?, V*, X	5

TGCat | Query | View | Actions | Help Topics | Help

---- currently viewing extractions table ----

+/-	Links	obsid	object	instrument	grating	ra (h:m:s)	decl (d:m:s)	date_obs (y-m-d t)	exposure (s)
☐	o p v s	100	4U 0614+091	HRC	LETG	06:17:07.414	+09:08:13.632	1999-11-28 22:26:07	26126.1
☐	o p v s	10759	4U 0614+091	ACIS	HETG	06:17:07.363	+09:08:13.488	2009-01-24 05:07:34	59678.4
☐	o p v s	10760	4U 0614+091	ACIS	HETG	06:17:07.366	+09:08:13.524	2009-01-18 23:07:34	44687.8
☐	o p v s	10858	4U 0614+091	ACIS	HETG	06:17:07.358	+09:08:13.524	2009-01-19 17:45:01	34436.8
☐	o p v s	10857	4U 0614+091	ACIS	HETG	06:17:07.366	+09:08:13.524	2009-01-21 13:49:21	58053.2

Let's look at one of the observations

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CHANDRA X-RAY OBSERVATORY

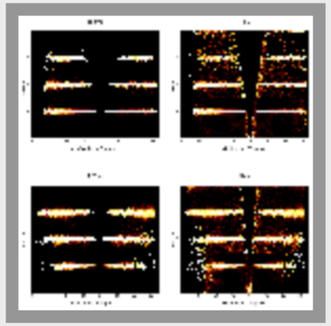
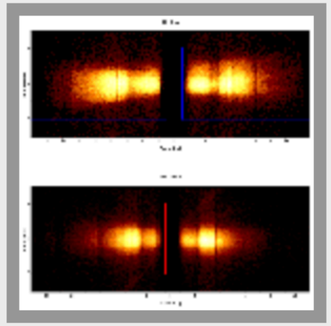
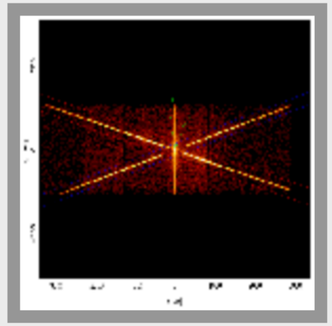
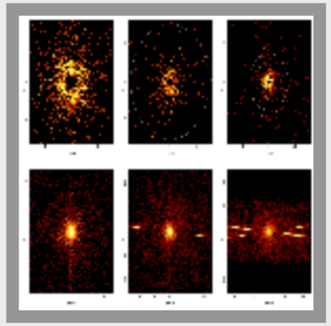
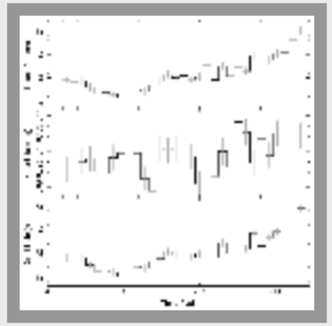
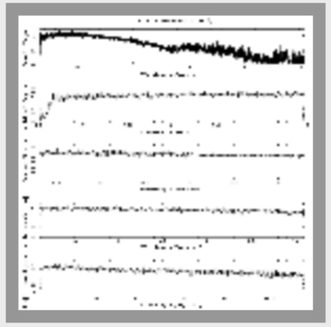
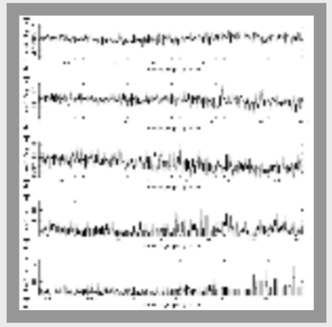
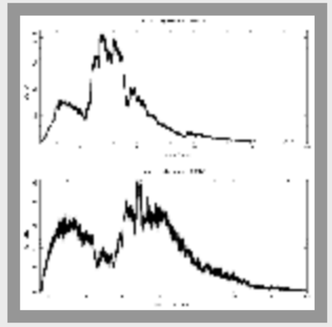
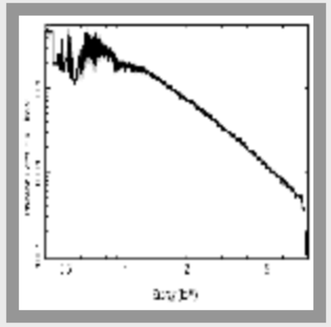
ObsID 10858 - Static images

TGCat | Query | View | Help Topics | Help

4U 0614+091

single extraction product

id	4244
srcid	1719
obsid	10858
review	good
obi	0
target	4U 0614+091
object	4U 0614+091
simbad_ID	V* V1055 Ori
instrument	ACIS
grating	HETG
exposure(s)	3.44e+4
ra	94.28066
decl	9.13709
heg_band(c/s)	2.17e+1
meg_band(c/s)	2.22e+1
leg_band(c/s)	2.21e+1
letg_acis_band(c/s)	2.21e+1
zero_order(c/s)	1.01e+0
readmode	TIMED
datamode	FAINT
proc_date	2012-02-05 04:13:16
zo_method	findzo
date_obs	2009-01-19 17:45:01

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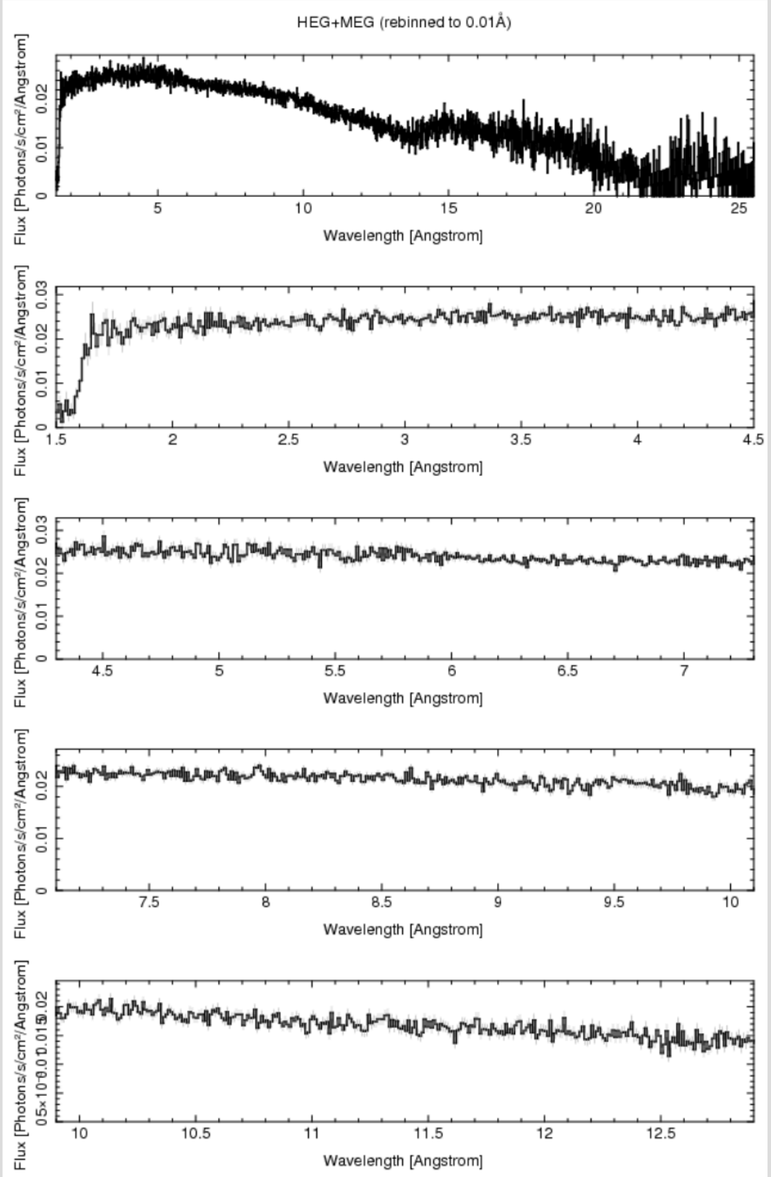
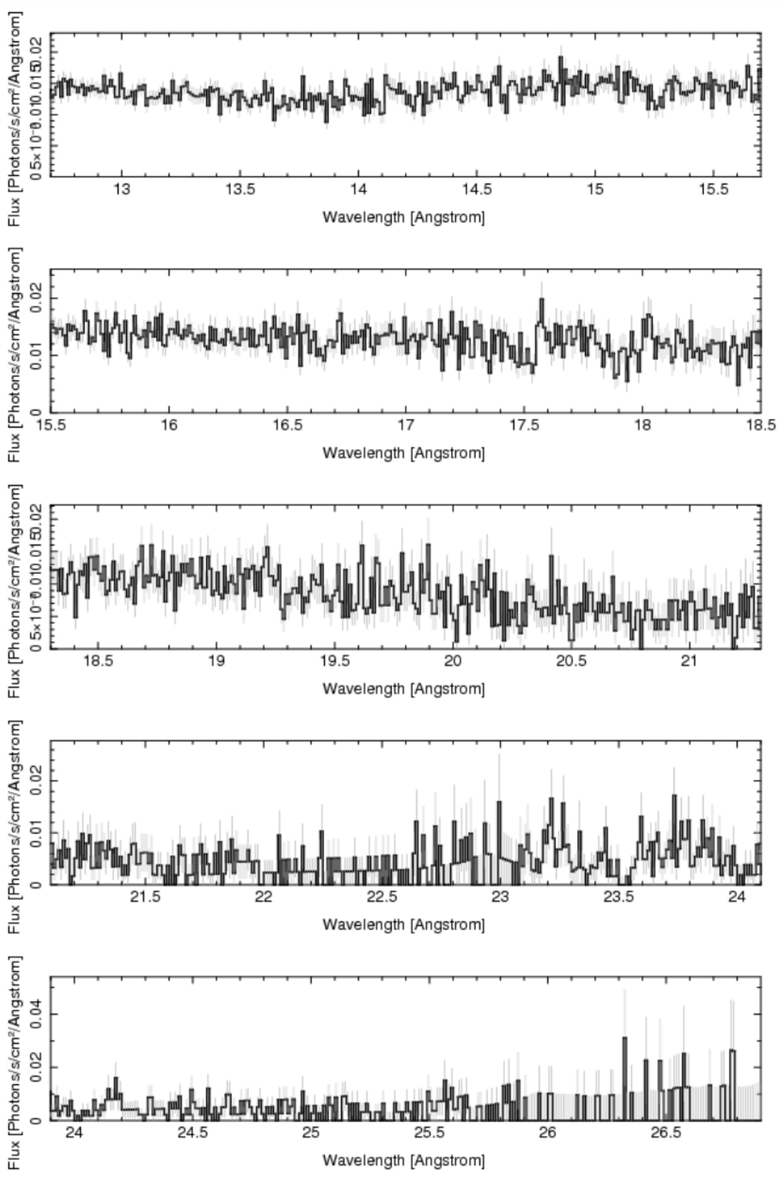
Detailed spectrum

close description full size

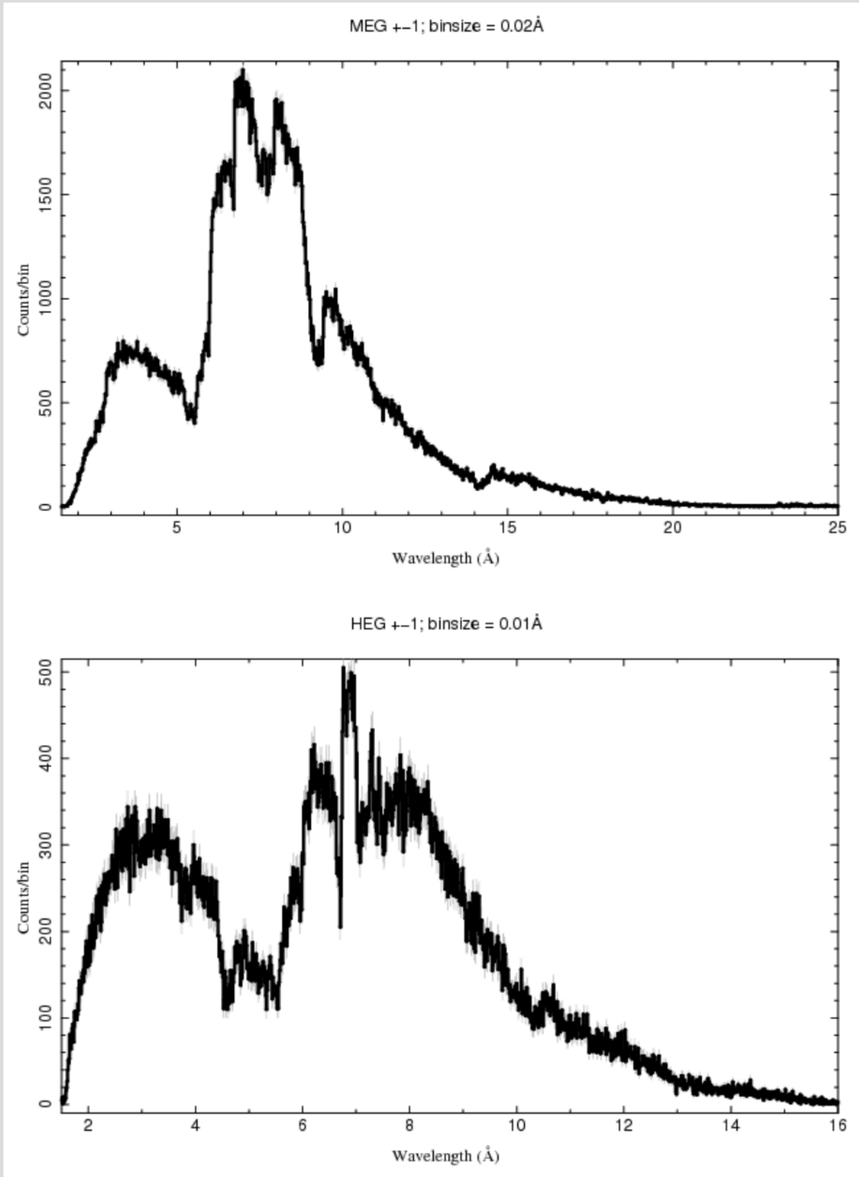


close description full size

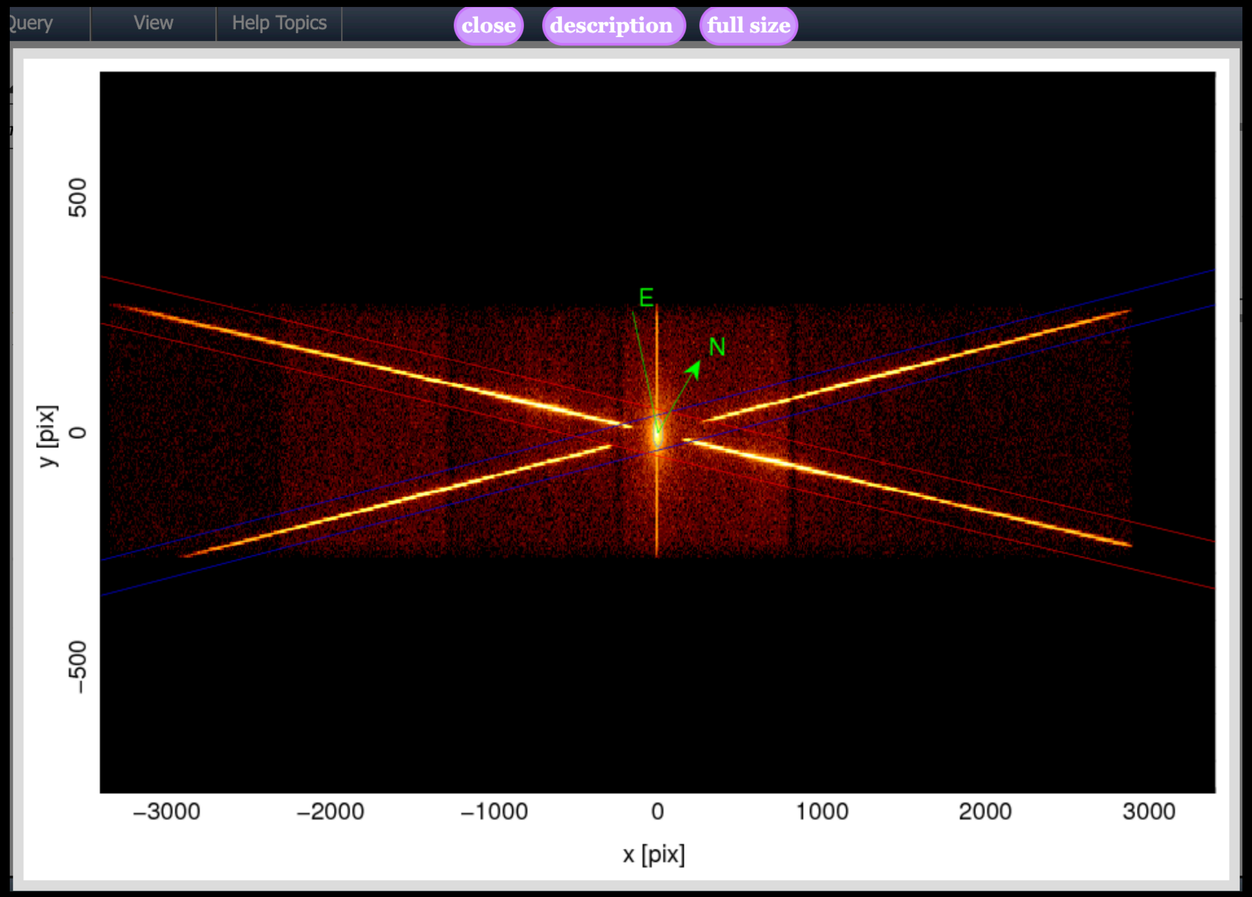


Broad view spectrum

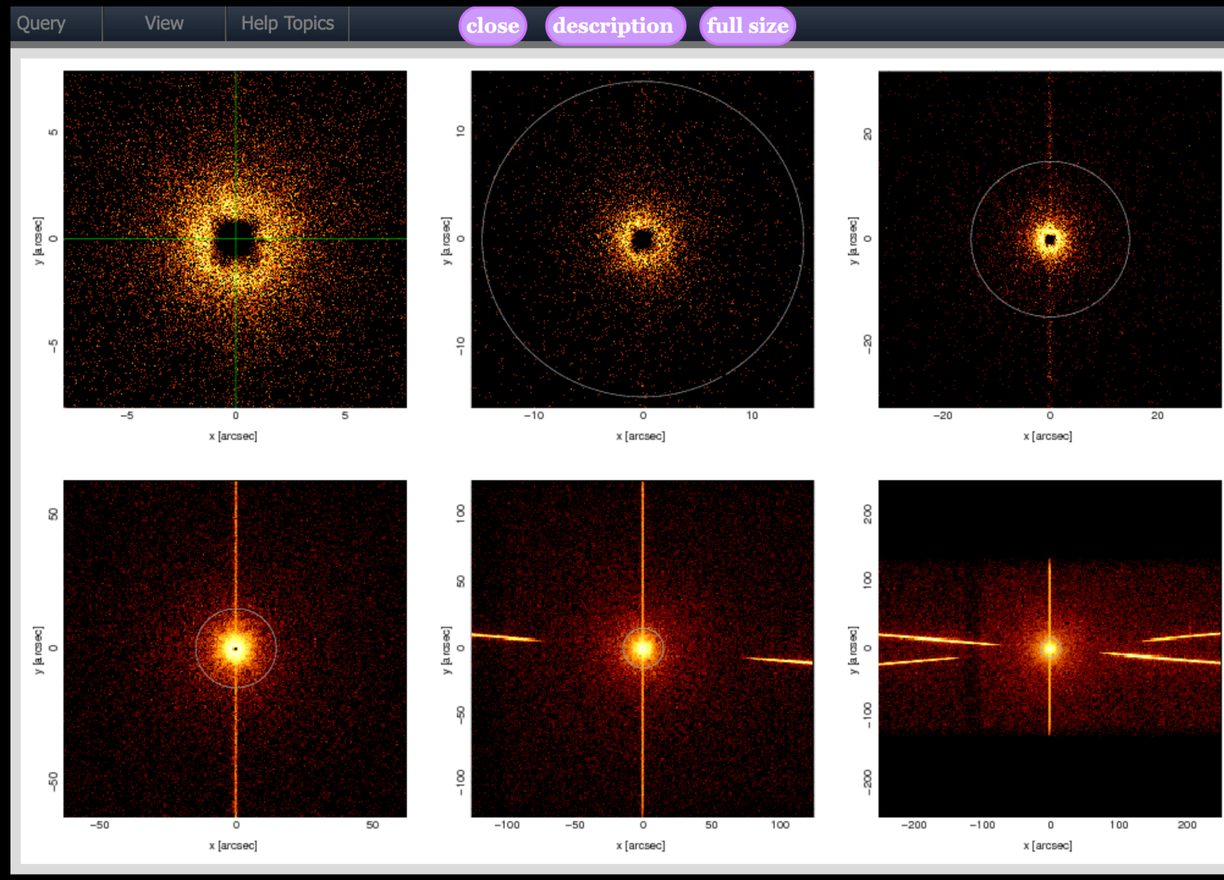
close description full size



Full detector image



Close view of target



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CHANDRA
X-RAY OBSERVATORY

ObsID 10858 - Interactive Plotting

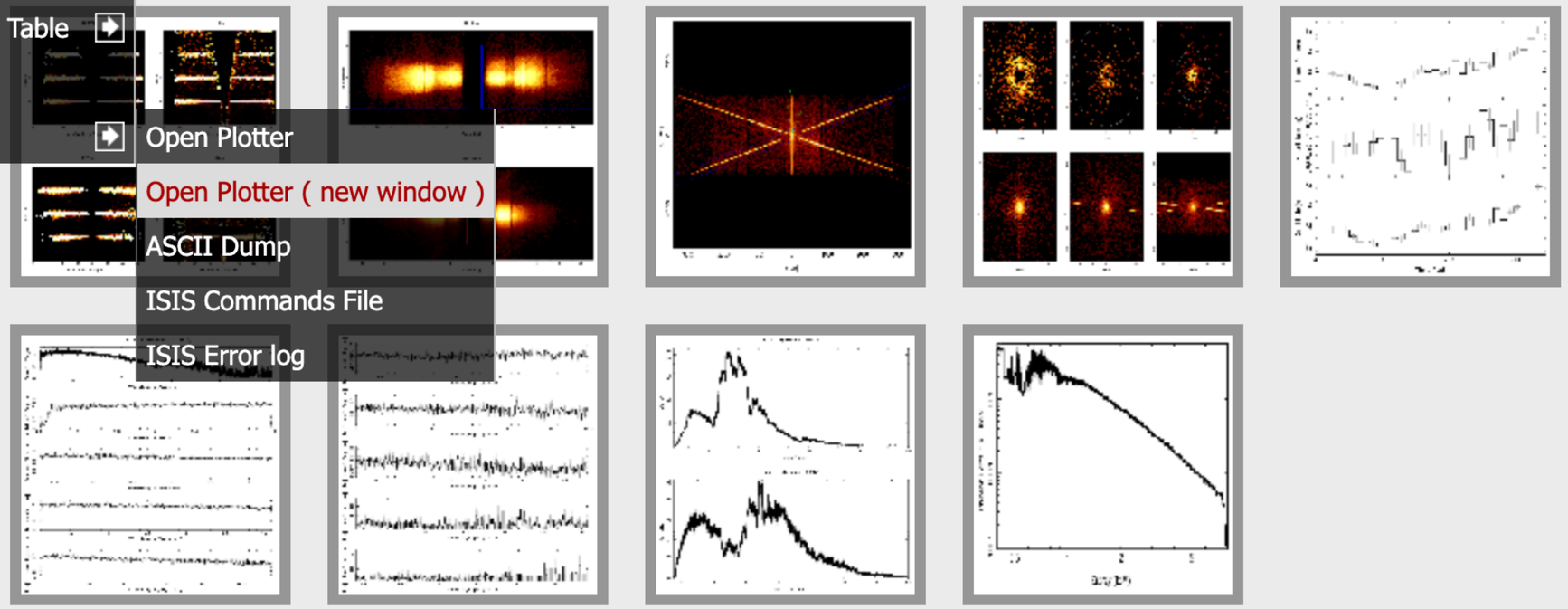
TGCat | Query | View | Help Topics | Help

- Preview Gallery
- File Table
- Spectral Properties Table
- VV Report
- Custom Plotting
  - Open Plotter
  - Open Plotter (new window)
  - ASCII Dump
  - ISIS Commands File
  - ISIS Error log

4U 0614+091

single extraction product

id	4244
srcid	1719
obsid	10858
review	good
obi	0
target	4U 0614+091
object	4U 0614+091
simbad_ID	V* V1055 Ori
instrument	ACIS
grating	HETG
exposure(s)	3.44e+4
ra	94.28066
decl	9.13709
heg_band(c/s)	2.17e+1
meg_band(c/s)	2.22e+1
leg_band(c/s)	2.21e+1
letg_acis_band(c/s)	2.21e+1
zero_order(c/s)	1.01e+0
readmode	TIMED
datamode	FAINT
proc_date	2012-02-05 04:13:16
zo_method	findzo
date_obs	2009-01-19 17:45:01



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CHANDRA X-RAY OBSERVATORY

ObsID 10858 - Interactive Plotting

Plot Type: Counts/χ/s X-Units: keV Y-Scale: Photons

XLog YLog ErrorBars

MEG Orders: +1 -1 HEG Orders: +1 -1 Combine

Xmins: Xmax: Ymin: Ymax:

Bin min-S/N: 1.0E-8 min-Ch: 4

Mark feature locations:

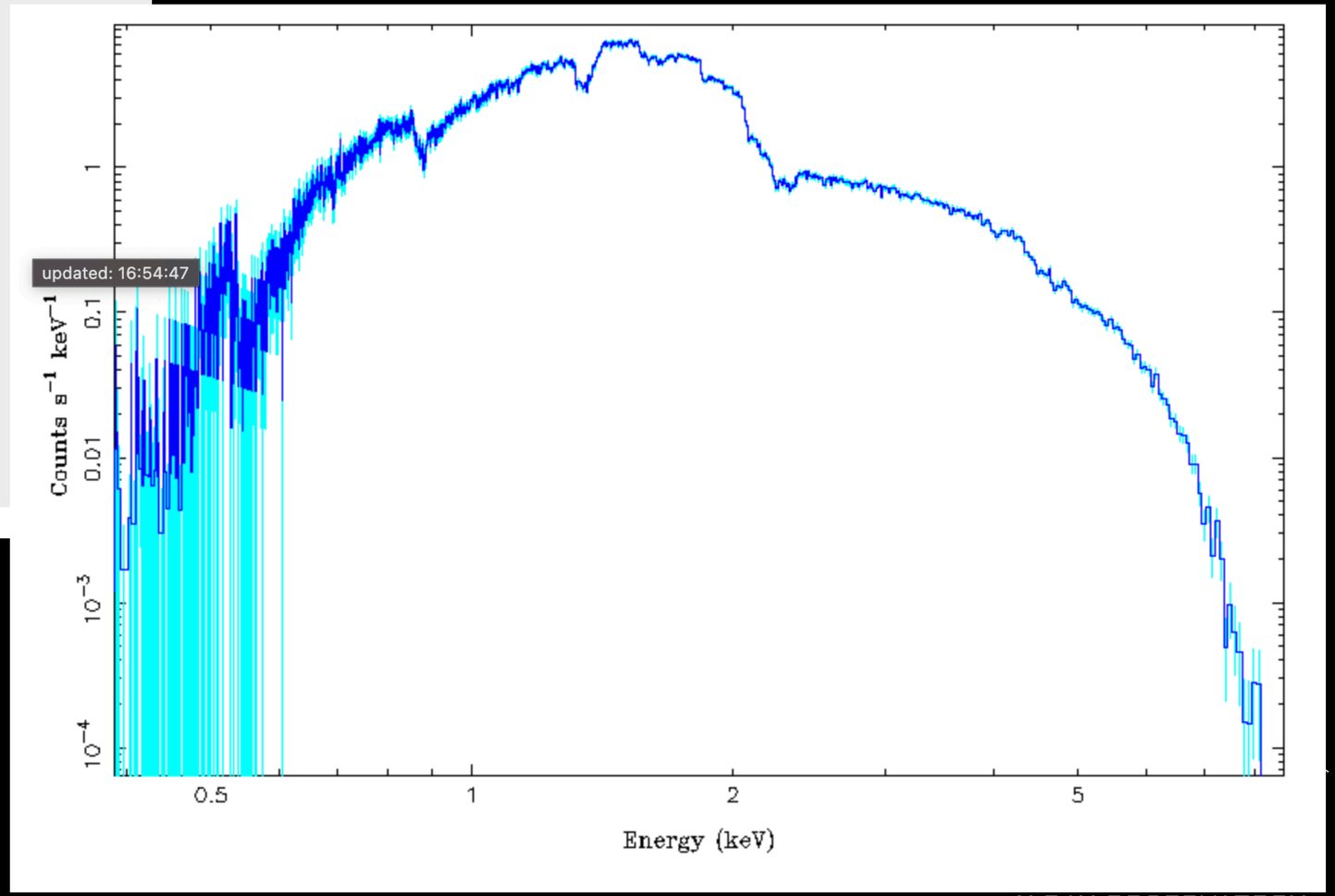
Lines: H-like He-like Fe

Redshift (applied to spectrum): 0.0 (v/c)

Save Current Parameters

Reset to Default Parameters | Use Saved Parameters

Replot



MIT KAVLI INSTITUTE

ObsID 10858 - Interactive Plotting

Plot Type: Counts/χ/s X-Units: keV Y-Scale: Photons

XLog YLog ErrorBars

MEG Orders: +1 -1 HEG Orders: +1 -1 Combine

Xmins: 1 Xmax: 3 Ymin: Ymax:

Bin min-S/N: 1.0E-8 min-Ch: 4

Mark feature locations:

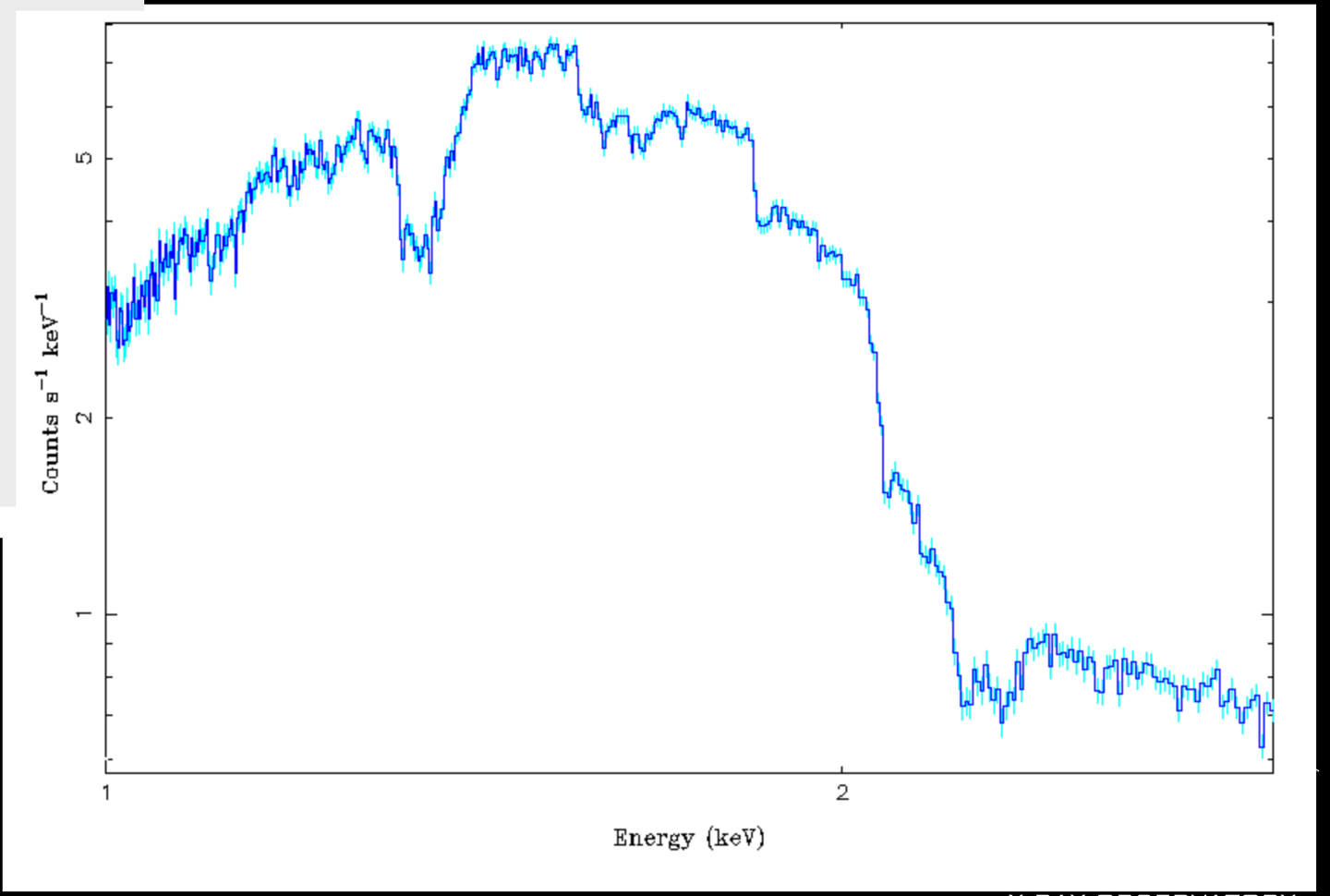
Lines: H-like He-like Fe

Redshift (applied to spectrum): 0.0 (v/c)

Save Current Parameters

Reset to Default Parameters | Use Saved Parameters

Replot



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Interactive Plotting with multiple observations
Lets go back to our original search

TGCat	Query	View	Actions	Help Topics		Help

---- currently viewing extractions table ----

+/-	Links	obsid	object	instrument	grating	ra (h:m:s)	decl (d:m:s)	date_obs (y-m-d t)	exposure (s)
☐	o p v s	100	4U 0614+091	HRC	LETG	06:17:07.414	+09:08:13.632	1999-11-28 22:26:07	26126.1
☐	o p v s	10759	4U 0614+091	ACIS	HETG	06:17:07.363	+09:08:13.488	2009-01-24 05:07:34	59678.4
☐	o p v s	10760	4U 0614+091	ACIS	HETG	06:17:07.366	+09:08:13.524	2009-01-18 23:07:34	44687.8
☐	o p v s	10858	4U 0614+091	ACIS	HETG	06:17:07.358	+09:08:13.524	2009-01-19 17:45:01	34436.8
☐	o p v s	10857	4U 0614+091	ACIS	HETG	06:17:07.366	+09:08:13.524	2009-01-21 13:49:21	58053.2

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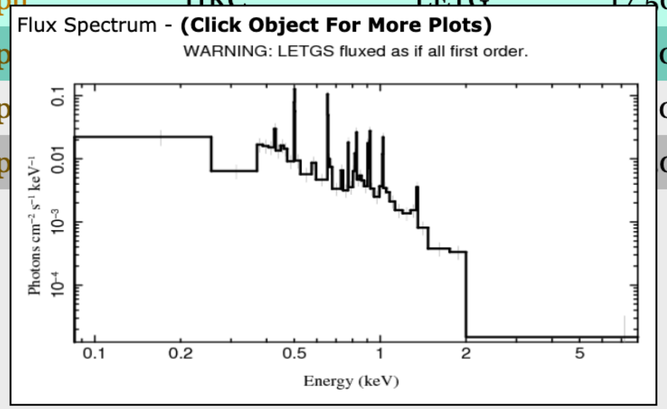
CHANDRA X-RAY OBSERVATORY

Interactive Plotting with multiple observations
Search for RS Oph

TGCat | Query | View | Actions | Help Topics | Help

---- currently viewing extractions table ----

+/-	Links	obsid	object	instrument	grating	ra (h:m:s)	decl (d:m:s)	date_obs (y-m-d t)	exposure (s)
☐	o p v s	7296	RS Oph	HRC	LETG	17:50:13.169	-06:42:28.872	2006-03-24 12:25:22	9970.33
☐	o p v s	7389	RS Oph	HRC	LETG	17:50:13.169	-06:42:28.296	2006-09-07 02:37:17	39890.9
☐	o p v s	7403	RS Oph	HRC	LETG	17:50:13.176	-06:42:28.188	2006-09-08 17:58:05	17922.8
☐	o p v s	7390	RS Oph	HRC	LETG	17:50:13.169	-06:42:28.224	2006-09-04 10:43:19	39682.2
☑	o p v s	7298	RS Oph	HRC	LETG	17:50:13.176	-06:42:28.620	2006-06-04 12:05:59	19966.6
☑	o p v s	7297	RS Op			0:13.162	-06:42:28.728	2006-04-20 17:24:53	6523.94
☐	o p v s	7280	RS Op			0:13.162	-06:42:28.620	2006-02-26 15:19:54	9917.4
☐	o p v s	23507	RS Op			0:13.154	-06:42:29.088	2021-08-27 00:57:52	28497



Notice the differences in spectra from 7298, 7292

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CHANDRA X-RAY OBSERVATORY

Interactive Plotting with multiple observations
Search for RS Oph

TGCat | Query | View | Actions | Help Topics | Help

Limit

---- currently viewing extractions table ----

Download
Go to Source Table
Plot (Combined)
Plot (Multiple)
Filter results
Clear filters
Reset query
Tag Query

+/-	Links	obsid	object	instrument	grating	ra (h:m:s)	decl (d:m:s)	date_obs (y-m-d t)	exposure (s)
☐	o p v s	7296	RS Oph	HRC	LETG	17:50:13.169	-06:42:28.872	2006-03-24 12:25:22	9970.33
☐	o p v s	7389	RS Oph	HRC	LETG	17:50:13.169	-06:42:28.296	2006-09-07 02:37:17	39890.9
☐	o p v s	7403	RS Oph	HRC	LETG	17:50:13.176	-06:42:28.188	2006-09-08 17:58:05	17922.8
☐	o p v s	7390	RS Oph	HRC	LETG	17:50:13.169	-06:42:28.224	2006-09-04 10:43:19	39682.2
☑	o p v s	7298	RS Oph	HRC	LETG	17:50:13.176	-06:42:28.620	2006-06-04 12:05:59	19966.6
☑	o p v s	7297	RS Oph	HRC	LETG	17:50:13.162	-06:42:28.728	2006-04-20 17:24:53	6523.94
☐	o p v s	7280	RS Oph	ACIS	HETG	17:50:13.162	-06:42:28.620	2006-02-26 15:19:54	9917.4
☐	o p v s	23507	RS Oph	ACIS	HETG	17:50:13.154	-06:42:29.088	2021-08-27 00:57:52	28497

Plot the two observations together

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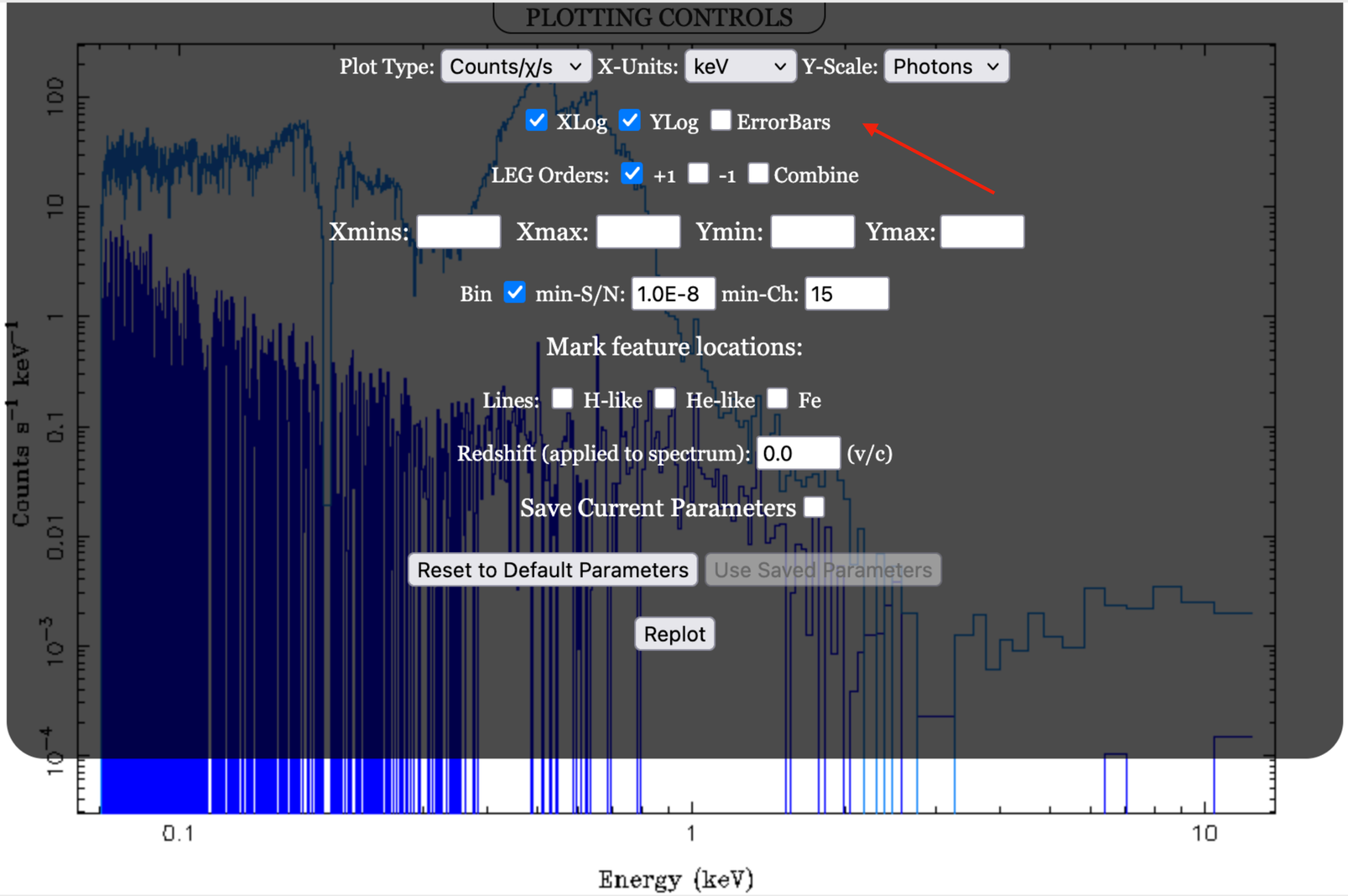
CHANDRA X-RAY OBSERVATORY

Multi Preview

combined extraction product

object	Multi Preview
obsid	7298, 7297
ids	2527, 2528
srcids	1852
instruments	HRC
gratings	LETG
total_exposure(s)	2.65e+4
ra	267.55487
decl	-6.70797
heg_band(c/s)	4.68e-1
meg_band(c/s)	2.51e+1
leg_band(c/s)	3.89e+1
letg_acis_band(c/s)	3.46e+1
zeroth_order(c/s)	3.53e+1
proc_date	2010-02-23 17:49:03.5000
date_obs	2006-05-13 02:45:26.0000



Lets clean up the graphs

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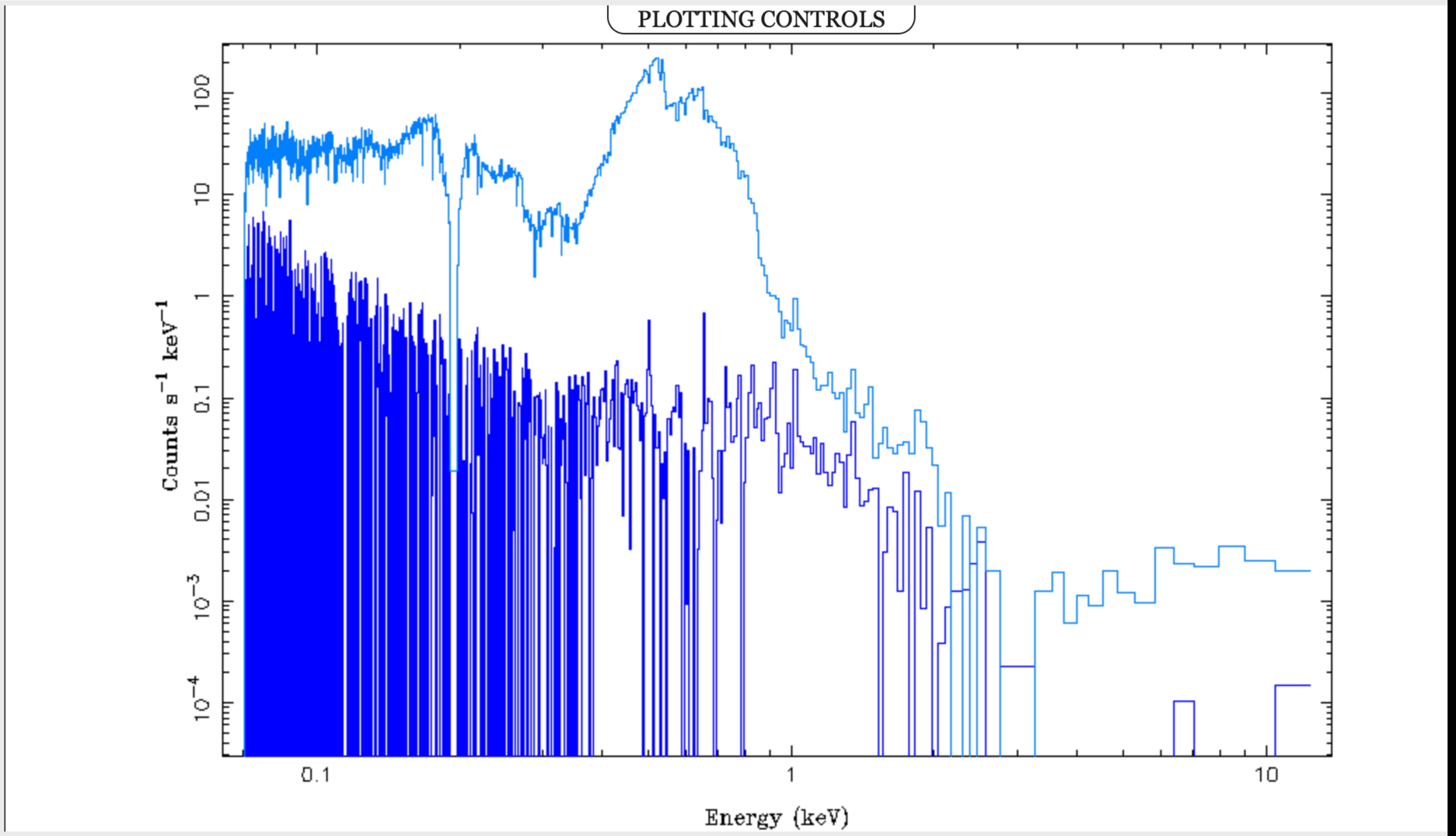
Multi Preview

combined extraction product

object	Multi Preview
obsid	7298, 7297
ids	2527, 2528
srcids	1852
instruments	HRC
gratings	LETG
total_exposure(s)	2.65e+4
ra	267.55487
decl	-6.70797
heg_band(c/s)	4.68e-1
meg_band(c/s)	2.51e+1
leg_band(c/s)	3.89e+1
letg_acis_band(c/s)	3.46e+1
zeroth_order(c/s)	3.53e+1
proc_date	2010-02-23 17:49:03.5000
date_obs	2006-05-13 02:45:26.0000



Variability is easily detected

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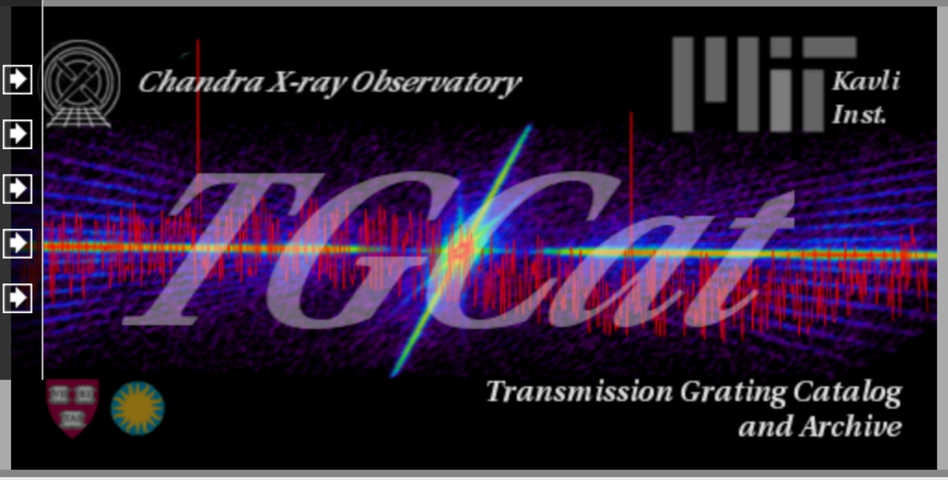
Start Here. Select functionality from menu items

- Intro
- Known Bugs
- Catalog Creation
- Searching TGCat
- Query Results
- Summary Products
- Plotting
- Demos/Tours/Guides



TGCat Announcements [all]

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Downloading Observations

Lets go back to our original search

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---- currently viewing extractions table ----

+/-	Links	obsid	object	instrument	grating	ra (h:m:s)	decl (d:m:s)	date_obs (y-m-d t)	exposure (s)
☑	o p v s	100	4U 0614+091	HRC	LETG	06:17:07.414	+09:08:13.632	1999-11-28 22:26:07	26126.1
☑	o p v s	10759	4U 0614+091	ACIS	HETG	06:17:07.363	+09:08:13.488	2009-01-24 05:07:34	59678.4
☐	o p v s	10760	4U 0614+091	ACIS	HETG	06:17:07.366	+09:08:13.524	2009-01-18 23:07:34	44687.8
☐	o p v s	10858	4U 0614+091	ACIS	HETG	06:17:07.358	+09:08:13.524	2009-01-19 17:45:01	34436.8
☑	o p v s	10857	4U 0614+091	ACIS	HETG	06:17:07.366	+09:08:13.524	2009-01-21 13:49:21	58053.2

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Downloading Observations

TGCat | Query | Help

+/-	Links	obsi	exposure (s)
☑	o p v s	100	26126.1
☑	o p v s	1075	59678.4
☐	o p v s	1076	44687.8
☐	o p v s	1085	34436.8
☑	o p v s	1085	58053.2

Please select the products you wish to download:

default:

☑ PHA2 (Level 2 counts spectrum file) ☐ PHA1 (Column format spectrum)

☑ RMF (Response matrix file) ☑ ARF (Ancillary response file)

auxillary:

☐ EVT2 (Level 2 event file) ☐ LTC (Binned light curve file)

☐ OBSPAR (Observation parameter file) ☐ SUM (Summary image/tables)

enter an email address for optional notification.
Click for more details.

optional email address: _____ *OR* tag: _____

Downloaded products can be found by navigating to TGCat->Package Download Area on the main menu bar.

Apply Close

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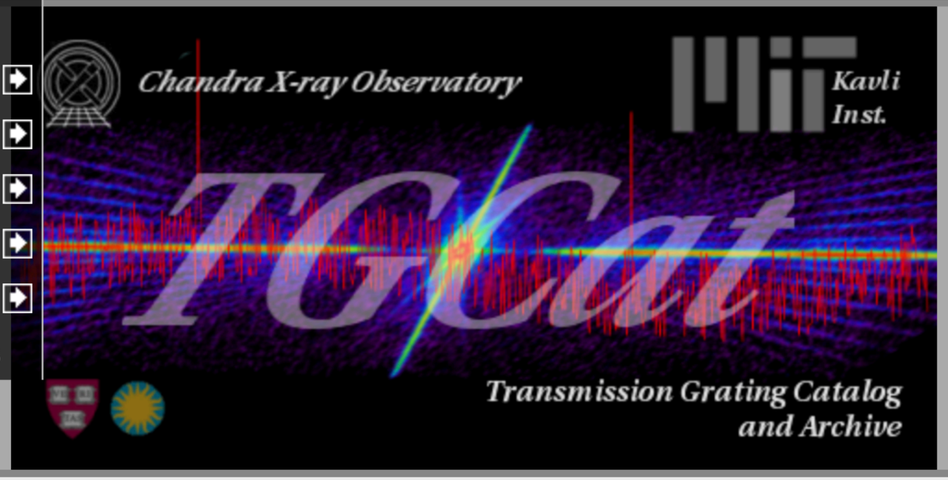

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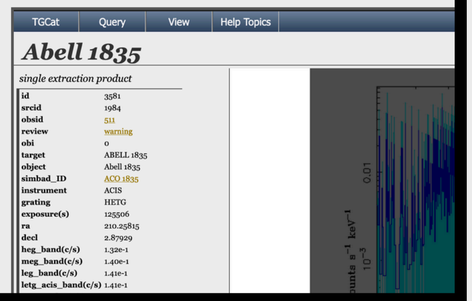
Known Bugs

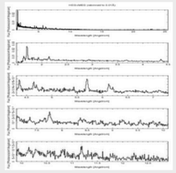
*If any bugs are found that are not listed below, please send any comments or updates to the **TGCat** administrator at mki-tgcat@mit.edu.*

Unable to click on plotting parameter boxes

TGCat allows users to plot spectra with either default parameters or s
the plot parameters to best highlight any desired features of the spectr

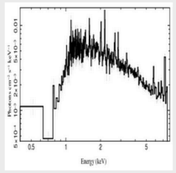


- **Flux spectrum**



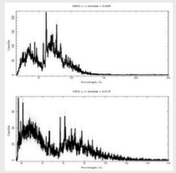
Flux spectrum ([photons/cm2/s]). The first panel shows a broad spectral range, while subsequent panels show detail in smaller wavelength ranges. Positive and negative orders have been summed. For HETGS, HEG and MEG have been combined by regridding the higher resolving power HEG data and responses to the MEG grid. Flux correction is done by dividing the counts by the model rate for a flat sp
gray. (There is no flux plot for LETG/HRC-S, since
sorting.)

- **Flux overview**



A flux spectrum, adaptively binned t
ratio and a minimum number of bin
flux density scale. This is used for a u
(and is the pop-up plot as you move
table's obsid or object links). For LE
order-sorting cannot be done, and th
artifacts.

- **Counts spectrum**



Counts spectrum (counts per bin) for summed positive and negative orders (first orders only, if ACIS). For LETGS, the background has been subtracted (ACIS background is usually negligible). For LETG/HRC-S, the first panel shows a broad spectral range, and subsequent panels show expanded region. For HETG we show the HEG and MEG separately.

- The source table, like the extractions table, provides links for the user

> ***s** -- Is a link to a _SIMBAD indentifier query using the "object" field in the **TG**Cat database*
> ***b** -- Searches BiRD (XMM RGS Catalog) on the SIMBAD identifier*
> ***d** -- Starts a DataScope (NVO) cone search centered on the SIMBAD identifier coordinates with a search radius (SR) equal to 0.05 degrees*

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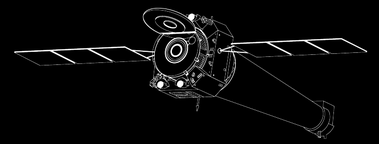

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Single observation

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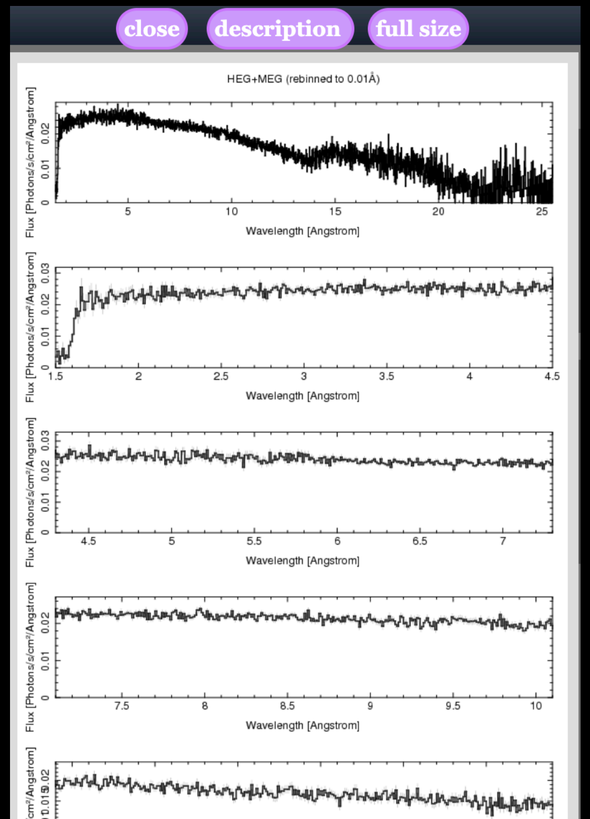
close description full size



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Search types

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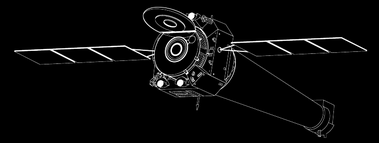

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