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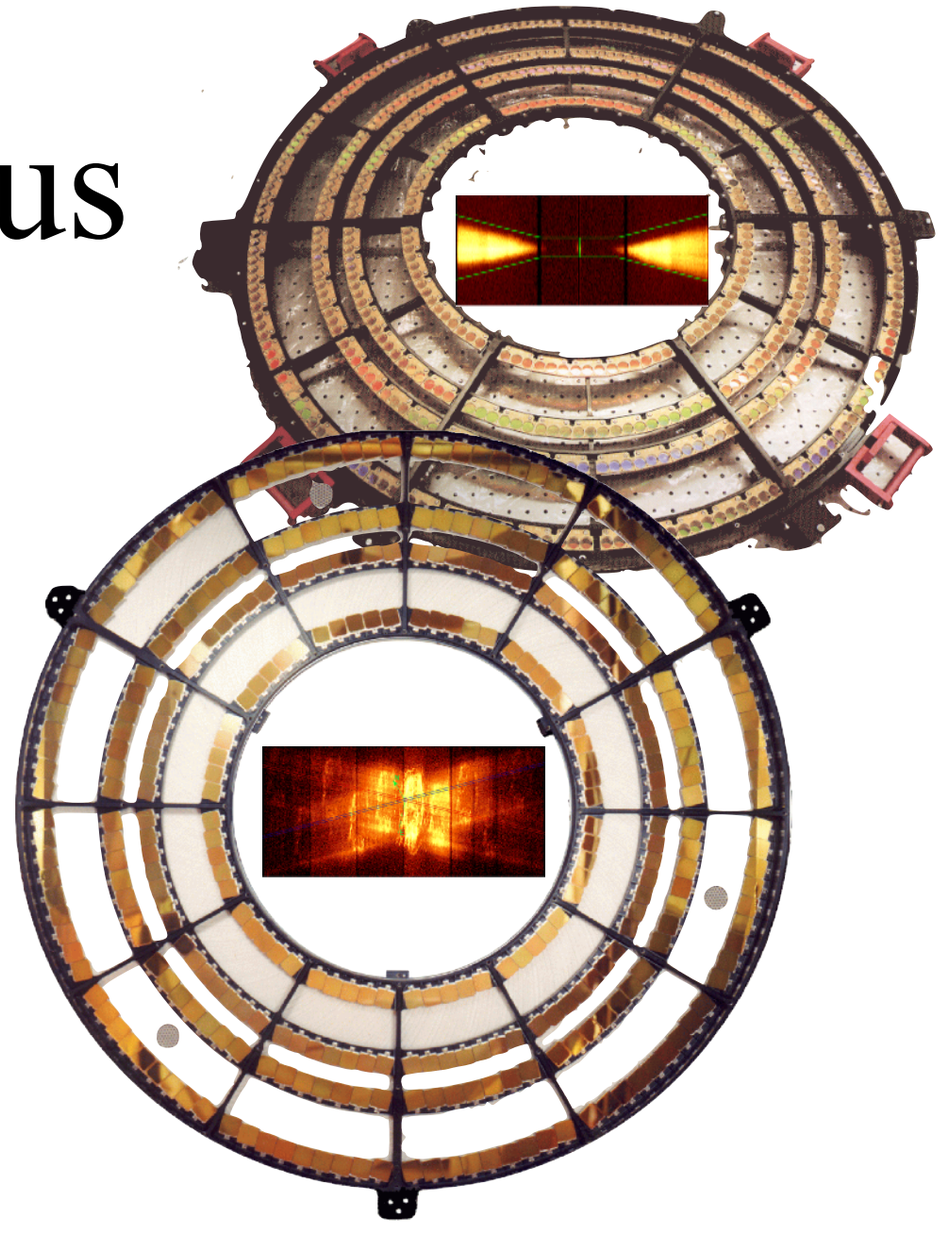
CHANDRA X-RAY OBSERVATORY

HETG/LETG — Status

Chandra Quarterly Review No. 57
25 June 2024

David Huenemoerder
dph@space.mit.edu

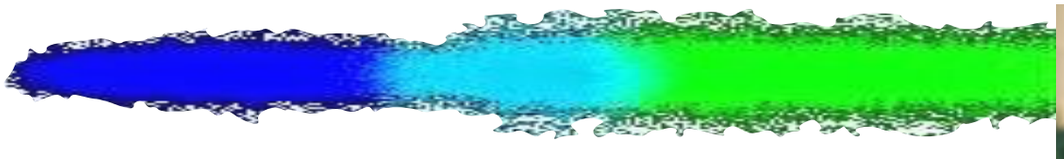


HETG IPI: Prof. Claude R. Canizares
MIT Kavli Institute

LETG IPIs: Dr. Peter Predehl
Max Planck Institute

Dr. Jelle Kaastra
SRON

faculty, staff;



postdocs

HETG GTO Science Program

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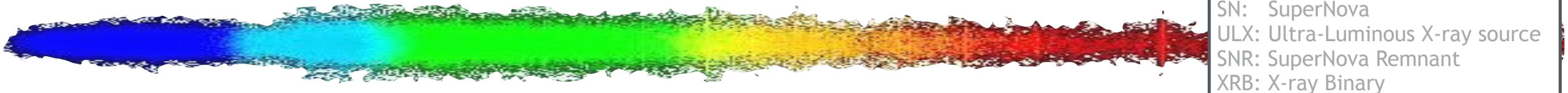
Proposal **Cycle 24** Jan 2023 (341 / 474 ks)

★XRB: 4U 1624-490 29/135 ks Accretion disk structure (with NuSTAR, XRISM)
★XRB: Cen X-3 48 ks Eclipsing X-ray pulsar; accretion (ongoing - low visibility)
★AGN: MCG-6-30-15 224 ks Time-dependent photoionisation modeling of outflows
★BH: SS 433 39/60 ks Relativistic jet physics (coordinated with HRC, Swift GO)

Proposal **Cycle 25** Jan 2024 (82 / 758 ks) (total of 1208 ks with all TOO)

★ULX/NS: M33 X-8 0/85 ks Pulsar wind outflow, absorption lines
★ Stars: ζ Puppis 0/190 ks Stellar winds, long-term monitoring
★XRB: 4U 1626-67 0/94 ks Ultra-compact binary pulsar line shapes and torque-reversal
★XRB: Her X-1 0/50 ks Pulsar accretion disk/wind dynamics during outburst (TOO)
★ISM: GX 9+9 82/190 ks Galactic silicon absorption edge survey
★BH: GRS 1915+105 0/100 ks Micro-quasar (TOO; coordinated with NICER, NuSTAR)
★GW Transient: 0/300 ks Gravitational Wave source followup (TOO)
★NS: Terzan 5 X-2 0/200 ks Neutron Star outburst (TOO) (a.k.a. IGR J17480-2446)



Jargon list:
AGN: Active Galactic Nucleus
BH: Black Hole
ISM: InterStellar Medium
NS: Neutron Star
SN: SuperNova
ULX: Ultra-Luminous X-ray source
SNR: SuperNova Remnant
XRB: X-ray Binary
LMXB: Low Mass XRB

LETG GTO Science Program

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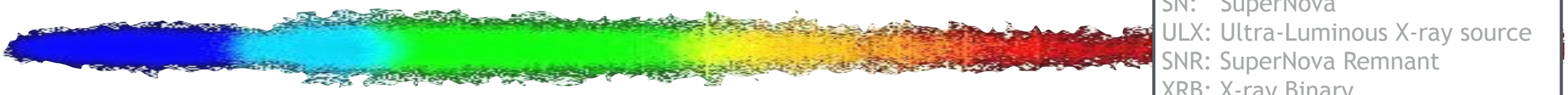
CHANDRA X-RAY OBSERVATORY

Proposal **Cycle 24**: start Jan 2023 (146 / 338 ks)

★ AGN: (Predehl/MPE)	WISEA J050222.16-341201.6	25 ks	Luminous z>5.6 quasars from eROSITA (ACIS-S)
★AGN: (Predehl/MPE)	WISEA J230341.02-542730.6	0/32	Luminous z>5.6 quasars from eROSITA (ACIS-S)
★AGN: (Predehl/MPE)	WISEA J050411.92-254959.0	26	Luminous z>5.6 quasars from eROSITA (ACIS-S)
★ Galaxies: (Predehl/MPE)	eFEDSJ083933	84	Shocks in an eROSITA detected galaxy cluster (ACIS-S)
★ AGN: (Kaastra/SRON)	NGC 3783	10/166	Outflows, variability (with XRISM) (ACIS-S/HETG)

Proposal **Cycle 25** start Jan 2024 (115 / 343 ks)

★ISM: (Predehl/MPE)	HD 115247	57 ks	Galactic bubbles absorption (LETG/HRC-S; w/ eROSITA)
★ISM: (Predehl/MPE)	HE1338-1423	58 ks	Galactic bubbles absorption (LETG/HRC-S; w/ eROSITA)
★ISM: (Predehl/MPE)	LEDA407	0/59 ks	Galactic bubbles absorption (LETG/HRC-S; w/ eROSITA)
★AGN: (Kaastra/SRON)	A1550	0/166 ks	Outflows, variability



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HETG/LETG Activities Summary

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CHANDRA X-RAY OBSERVATORY

Performance Nov 2023 — May 2023

HETG/ACIS-S: 845 ks

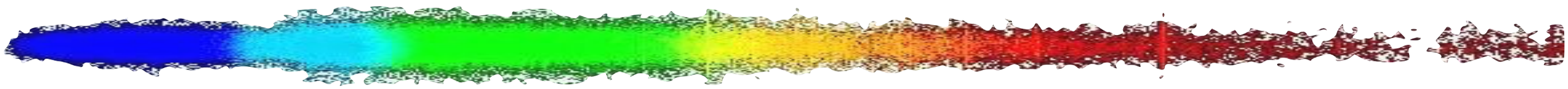
- 46 observations on 13 targets (17 GO, 19 GTO, 8 DDT, 2 Cal)

LETG:

- 16 LETG/HRC-S observations, 4 targets (189 ks; 4 GO, 10 GTO, 2 Cal)
- 12 LETG/ACIS-S observations, 1 target (351 ks; 12 Cal — contamination)
- 1 LETG/HRC-I observation, 1 target (2 ks; 1 Cal)

All instruments: 11.1 Ms
Grating instruments: 1.4 Ms (13%)

Grating performance is nominal.



TGCat Status

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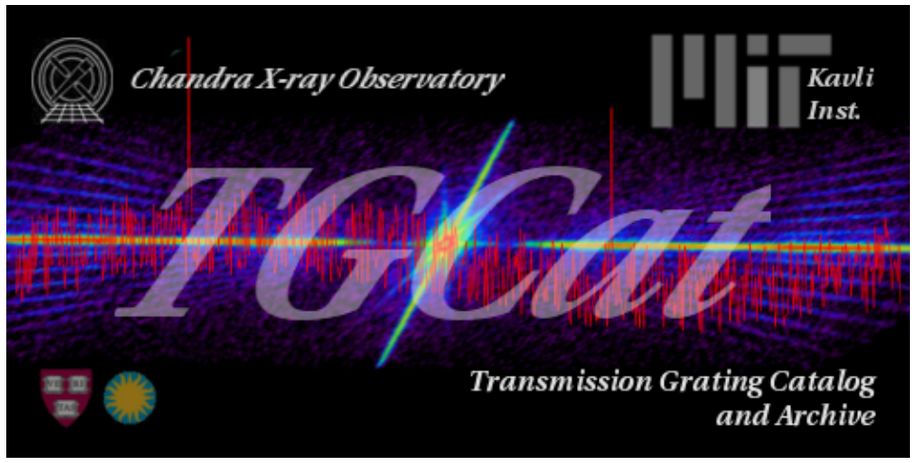
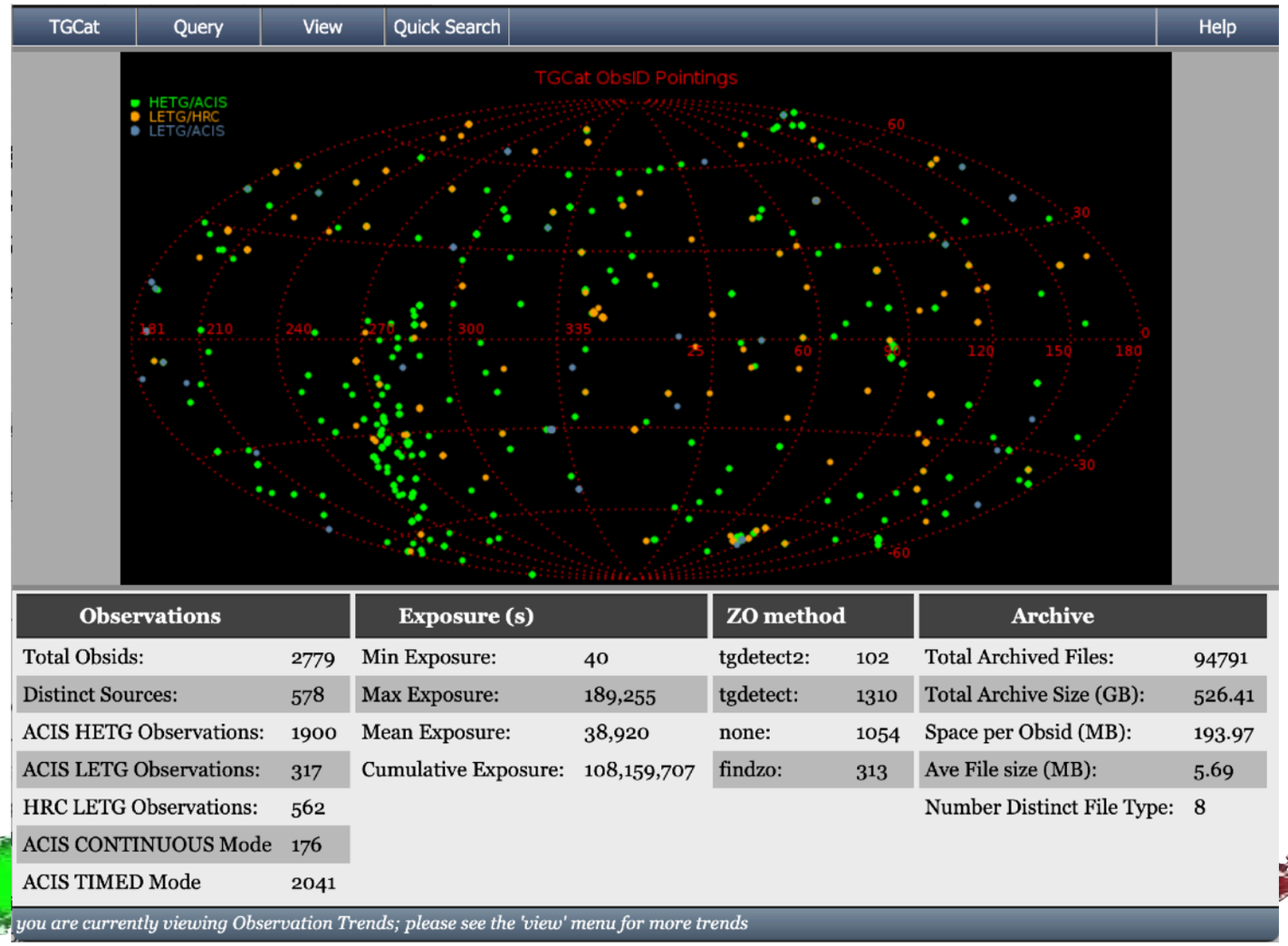


http://tgcat.mit.edu

Security updates / migration finished.
Back on-line as of December, 2023.

<http://tgcat.mit.edu/dev/tgcat/tgTrend.php>



Observations		Exposure (s)		ZO method		Archive	
Total Obsids:	2779	Min Exposure:	40	tgdetect2:	102	Total Archived Files:	94791
Distinct Sources:	578	Max Exposure:	189,255	tgdetect:	1310	Total Archive Size (GB):	526.41
ACIS HETG Observations:	1900	Mean Exposure:	38,920	none:	1054	Space per Obsid (MB):	193.97
ACIS LETG Observations:	317	Cumulative Exposure:	108,159,707	findzo:	313	Ave File size (MB):	5.69
HRC LETG Observations:	562					Number Distinct File Type:	8
ACIS CONTINUOUS Mode	176						
ACIS TIMED Mode	2041						

you are currently viewing Observation Trends; please see the 'view' menu for more trends

HETG Observations Historical Trends

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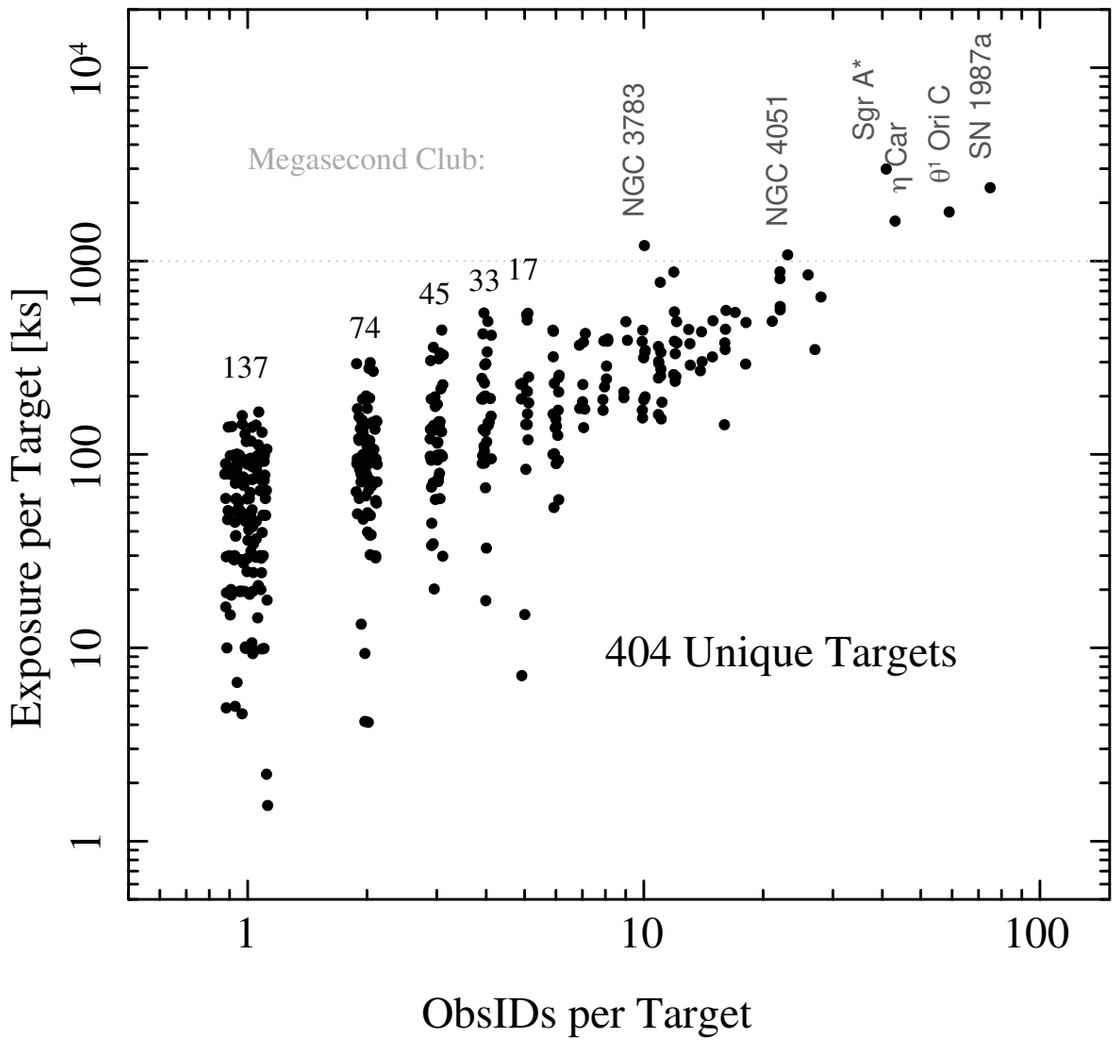
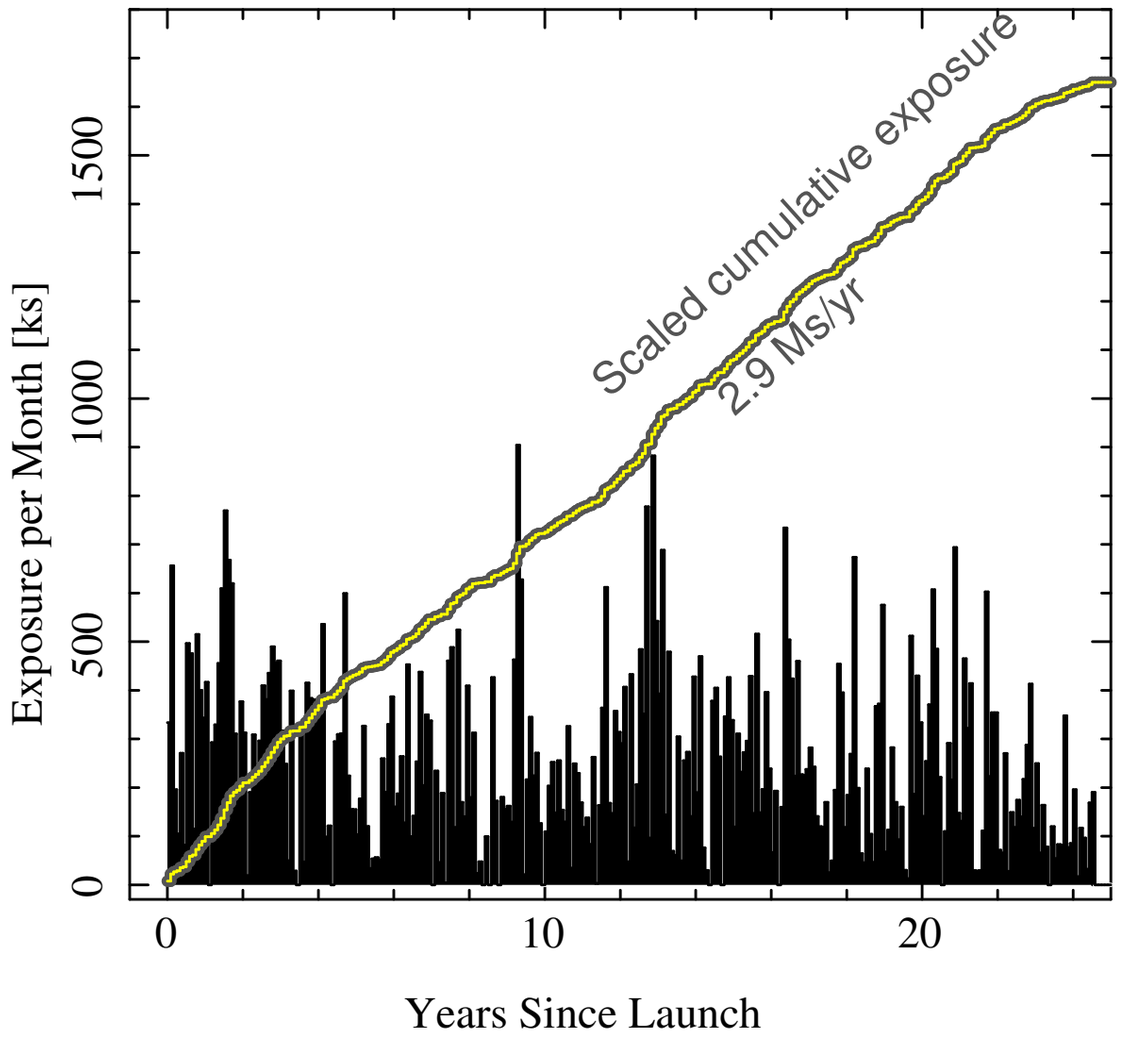
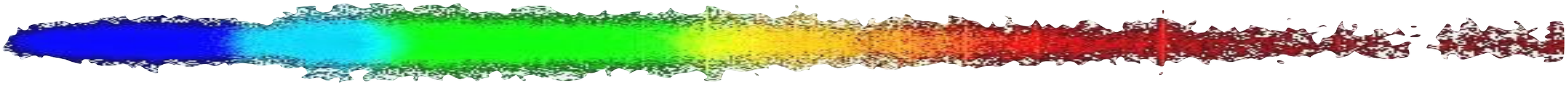
CHANDRA X-RAY OBSERVATORY

Exposure per target, and number of visits



Exposure per month, and cumulative exposure



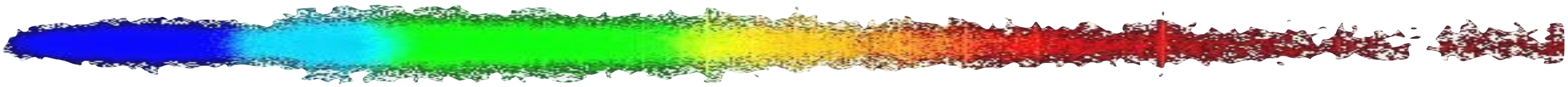


Calibration Updates

ACIS High-T Operations: OK to use HETG
(but for warmest temperatures, offset to low CHIPY).
Warning in Verification & Validation report if limits exceeded.

HETG 2nd and 3rd order efficiencies: in progress.

Line-spread-function parameters for HETG/HRC-I and off-axis pointings: in progress.



Some Scientific Results Published in the Past 6 Months (1/2)

The Astrophysical Journal Letters, 966:L23 (6pp), 2024 May 10
https://doi.org/10.3847/2041-8213/ad4095

Chandra HETG X-Ray Spectra and Variability of π Aqr, a γ Cas-type Be Star

David P. Huenemoerder[1], Pragati Pradhan[2], Claude R. Canizares[1], Sean Gunderson[1], Richard Ignace[3], Joy S. Nichols[4], A. M. T. Pollock[5], Norbert S. Schulz[1], Dustin K. Swarm[6], and José M. Torrejón[7]

HETGS 100ks
Cycle 23
(6 Observations,
Aug-Oct 2022)

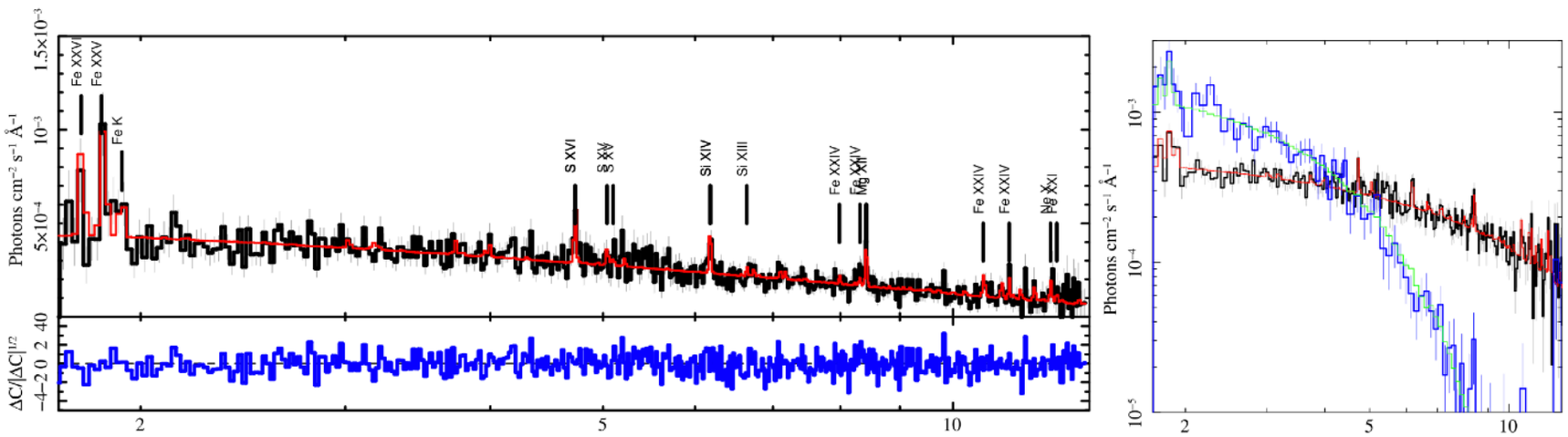
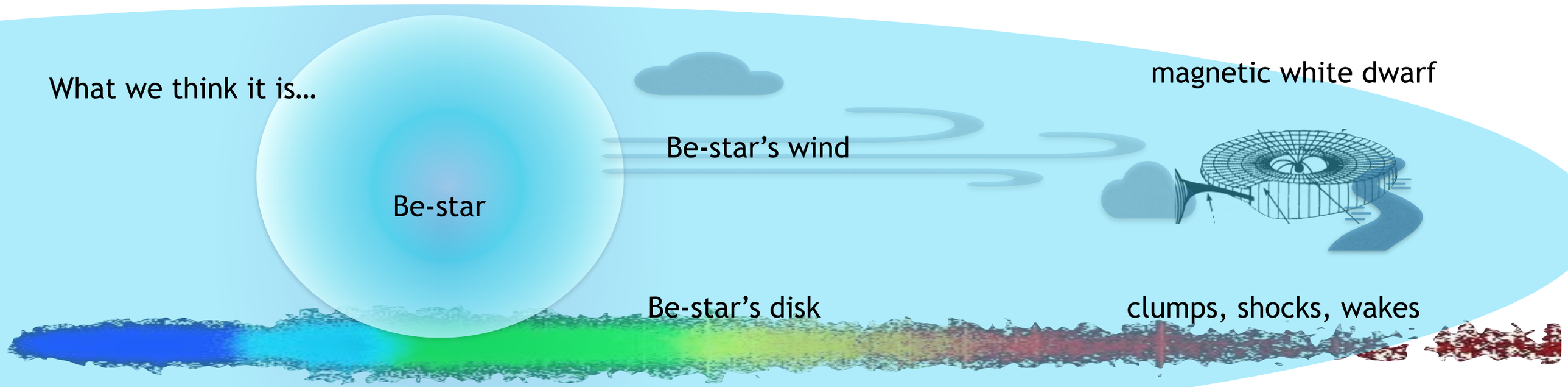


Figure 1. Left: HETG spectrum of π Aqr in black, which is the merged HEG and MEG first orders, excluding the high-hardness ratio observation (27325). In red is a model using three APEC components plus a Gaussian for the putative Fe K fluorescence. On the right, we compare the high-hardness ratio state spectrum (blue) to the rest (black and red).

Mysterious γ Cas type stars: Optically a Be star. In X-rays, MUCH more luminous than typical B-stars, and VERY hot.



Some Scientific Results Published in the Past 6 Months (2/2)

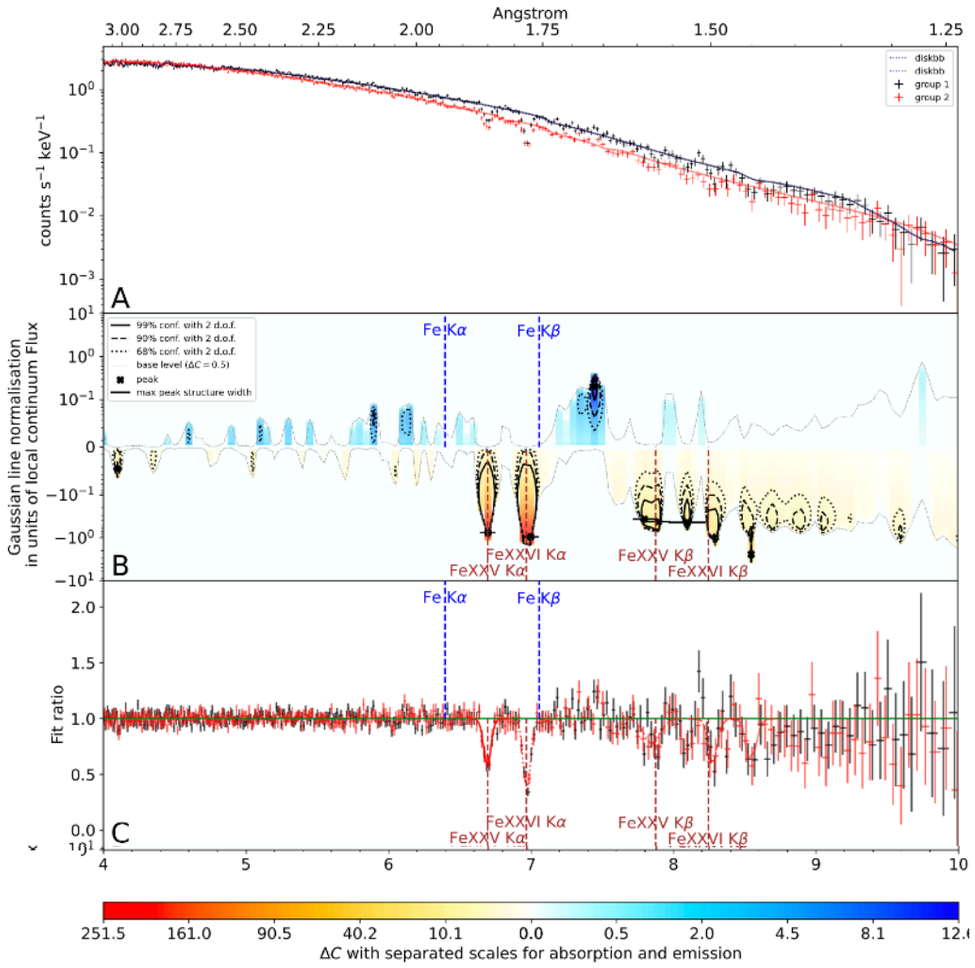
A&A 681, A49 (2024)
https://doi.org/10.1051/0004-6361/202346920

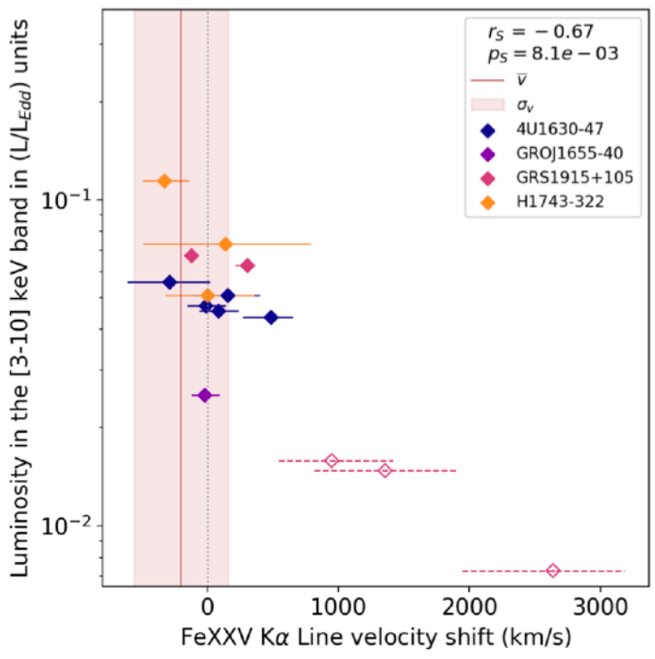
Astronomy & Astrophysics

The current state of disk wind observations in BHLMXBs through X-ray absorption lines in the iron band

M. Parra[1,2], P.-O. Petrucci[1], S. Bianchi[2], V. E. Gianolli[1,2], F. Ursini[2], and G. Ponti[3,4]

(For about 40 sources reprocessed from XMM archives, or downloaded from TGCat.)





"With the *Chandra* instrument, which proves to be the only instrument sufficiently precise to reliably measure the outflow velocity, the absorption signatures show a global trend of very small blueshifts."

25 years of HETG-supported Postdocs and Graduate Students

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Postdocs

Rozenn Boissay
Bram Boroson
Esra Bulbul
Daniel Castro
Lia Corrales
Tracy Delaney
Daniel Evans
Sarah Gallagher
Jonathan Gelbord
Victoria Grinberg
Ming Feng Gu
Sean Gunderson
Sebastian Heinz
Paul Hemphill
Wynn Ho
Li Ji
Mario Jimenez-Garate
David Kaplan
Peter Kosec
Jasmina Lazendic
Julia Lee
Ana Lia Longinotti
Sera Markoff
Kendrah Murphy
Joey Neilsen
Patrick Ogle
Thomas Pannuti
Pragati Pradhan
David Principe
Ioanna Psaradaki
Daniele Rogantini
Paola Testa
Patrick Wojdowski
Mackenna Wood
Jonathan Wu
Jun Yang
Yangsen Yao
Andrew Young
Shuo Zhang

Graduate Students

David Buote
Nat Butler
Kathleen Early
Tamer Elkholy
Yao-Ching Ku
Taotao Fang
Maya Farhoud
Derek Fox
Eric Gaidos
Rob Gibson
Amalia Hicks
Una Hwang
Tesla Jeltema
Adrienne Juett
Miriam Krauss
Joshua Migliazzo
Jon Miller
Alberto Moel
Gabrielle Owen
Rob Rutledge
Mark Schattenburg
Michael Stage
David Um