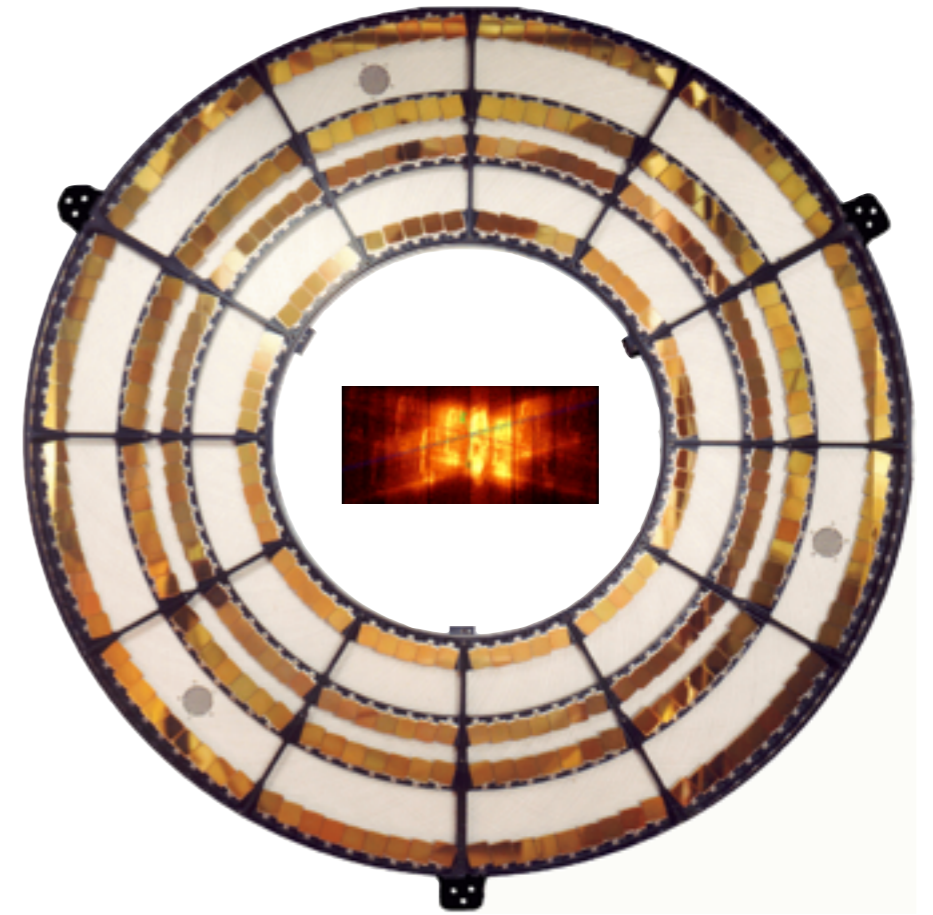




MIT KAVLI INSTITUTE

HETG - Status

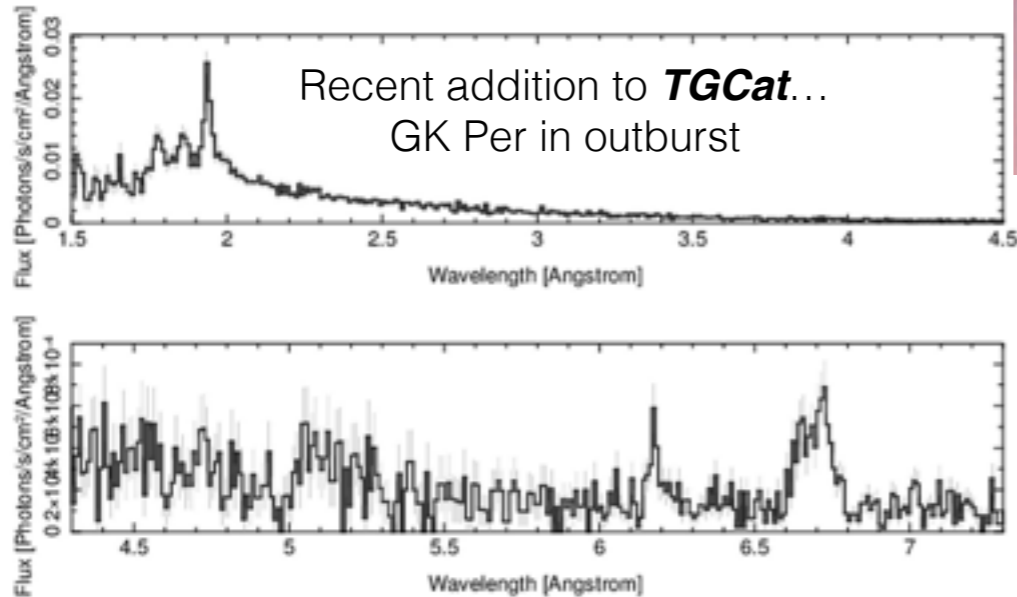
Chandra Quarterly Review No. 41
13 April 2016



David Huenemoerder
dph@space.mit.edu

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

Ongoing HETG Team Activities Summary



TGCat	Query	View	Actions	--- 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)	
<input type="checkbox"/>	opvs 17649	1RXS J180408.9-342058	ACIS	HETG	18:04:08.407	-34:20:50.676	2015-04-14 14:55:34	29958.3	
<input type="checkbox"/>	opvs 17393	3C 273	ACIS	HETG	12:29:06.701	+02:03:08.496	2015-07-14 06:34:09	29549.8	
<input type="checkbox"/>	opvs 17648	GK Per	ACIS	HETG	03:31:12.074	+43:54:14.796	2015-04-04 08:01:02	34508.5	
<input type="checkbox"/>	opvs 18365	HZ 43	HRC	LETG	13:16:21.655	+29:05:53.448	2016-01-07 22:45:41	19953.1	

Swift, Chandra and NuSTAR observations of GK Per during the 2015 outburst
 ATel #7404; Polina Zemko (University of Padua, Italy), Marina Orio (INAF Padova, Italy and University of Wisconsin, Madison, USA) and Philip A. Evans (University of Leicester, UK)
 on 16 Apr 2015: 16:39 UT

To date: **TGCat** has **1,624** extractions for **450** objects (+55/26 since last report)

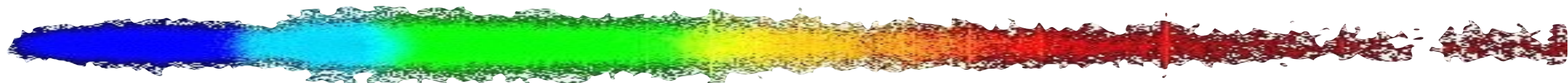
HETG/ACIS-S Performance (Sept 2015 — March 2016); 2080 ks

- 43 HETG observations on 12 targets (30/13 GO/GTO)
- 0 HETG Cal observations

LETG Performance (Sept 2015 — March 2016); 342 ks

- LETG/ACIS-S GO/GTO Usage: 0 (LETG/GTO time used with HETG)
- LETG/ACIS-S Cal: 3 observations, 1 target (Contamination monitoring, Mrk 421 “big dither”)
- LETG/HRC-S GO/GTO: 4 observations, 2 targets (4/0 GO/GTO)
- LETG/HRC-S Cal: 1 observation (HZ 43)

Grating performance is nominal.



Ongoing HETG Team Activities



GTO Science Program

Cycle 16:

- ★ Hot star: τ CMa 285 ks (complete) O9 II; stellar winds
- ★ XRB: Ser X-1 135 ks (complete) Si K edge study
- ★ AGN: PDS 456 150 ks (complete) QSO, warm absorber
- ★ XRB: 4U 1626-67 50 ks (**pending**) Ultra-compact LMXB pulsar
- ★ XRB: 4U 0513-40 150 ks (**partial**) Ultra-compact object
- ★ NS: Terzan 5 X-2 200 ks (**untriggered** TOO) Neutron star

Cycle 17: 2 TOO proposals competed; majority of GTO plan deferred to post-peer review

- ★ Hot star + NS: Vela X-1 180 ks clumpy winds; phase 0.15 — 0.45
- ★ XRB: SMC X-1 100 ks TOO, pulsar, high state, emis/abs lines
- ★ AGN: NGC 3227 150 ks Seyfert; warm absorber, soft excess
- ★ NS: Terzan 5 X-2 200 ks TOO (10% prob); Neutron Star Equation of State
- ★ Hot Star: WR 25 90 ks colliding winds, near periastron
- ★ LMXB: GX 3+1 130 ks resolve broad lines
- ★ LIGO/GW GW2016???? 300 ks TOO (10%) Gravitational wave transient

Postdoc status/activities:

Victoria Grinberg — since December, 2013; Lia Corrales — since July, 2014

★ Both presenting on software for high-resolution analysis at ESA/Madrid, May 2016.

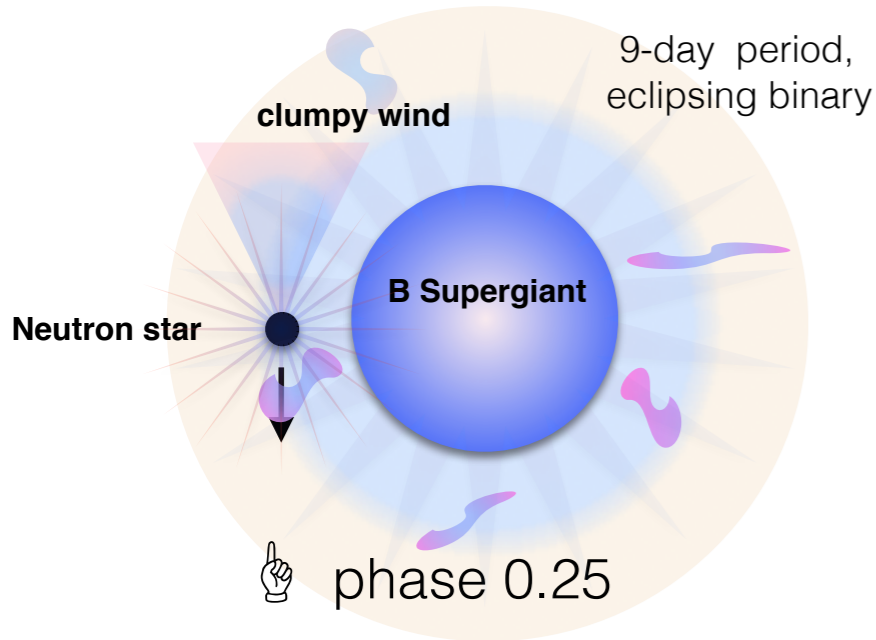
★ Both completing their terms by end of 2016

(Dr. Grinberg → ESTEC/ESA Fellowship; Dr. Corrales → Wisconsin/Einstein Fellowship)

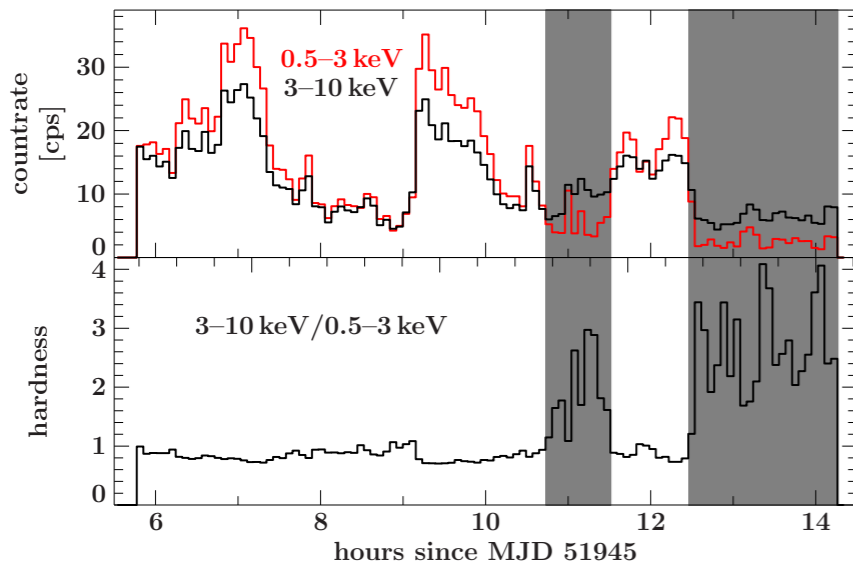
Wind Dynamics in Vela X-1 (Grinberg et al)



MIT KAVLI INSTITUTE

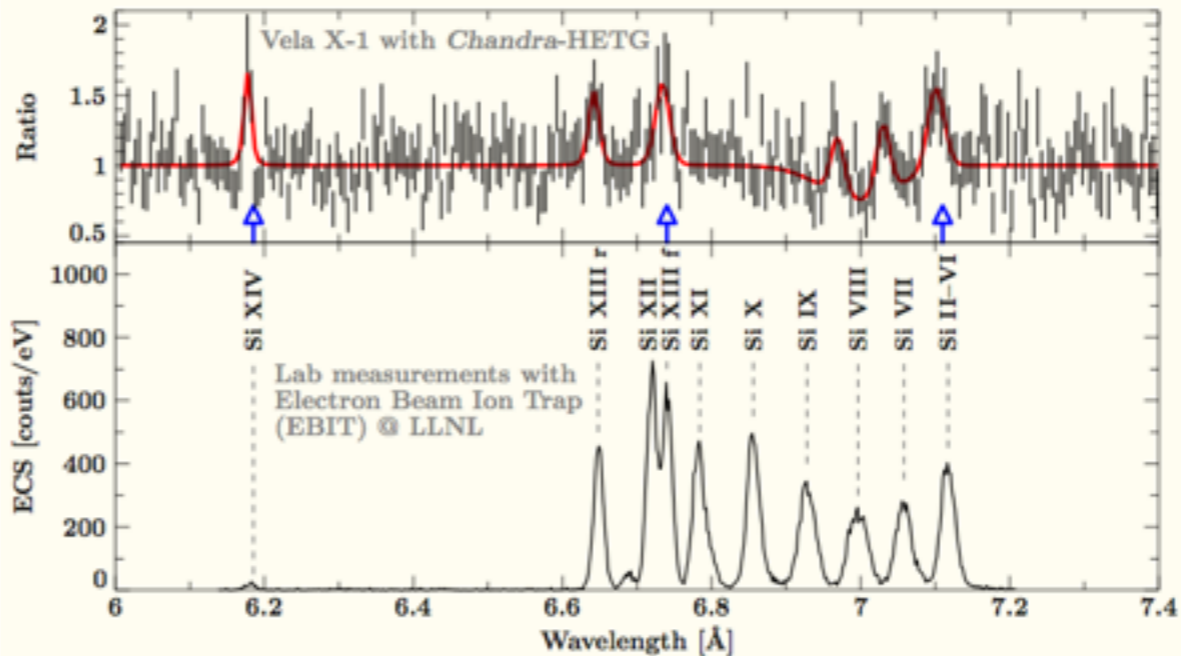


From phase 0.25 light curve (2001 data), select hard (absorbed) states



Use the neutron star to probe the structure of the wind, as it plows through clumps:

- ▶ use only dipping/high absorption phases (**not** attempted previously!)
- ▶ use newest lab reference values for line energies



high ionization lines: ionized part of the wind
 $v \approx -300$ km/s

low ionization lines: reflection from clumps
 $v \approx -1000$ km/s

- ⇒ quickly moving cold clumps (line-driven winds!) in a quasi-static ionized continuum?
- ⇒ or patchy accretion wake?

Planned GTO observations will observe more at critical phases.