



MIT Kavli Institute
for Astrophysics
and Space Research

HETG - Status

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*HETG's First Decade
of Discovery*

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Ongoing HETG Team Activities Summary

- HETG Performance (mid-March'09 through August'09)
 - 22 HETG obsids on 8 Science + 1 Cal target
 - * 1 of our GTO targets, GX 5-1.
 - * Last HETG obs on 6 July: limit switch anomaly on retraction.
 - * Next HETG obs ~ 7 September (SN 1987A cont.)
 - **FWHM of streak** is steady; HETG performance is nominal.
 - LETG usage: 4 obsids on 1 Science + 3 Cal targets
 - * Recent obsid 11015, 26 August, LETG-HRC-S; insertion OK.

- HETG Calibration

- Marx 4.4.0 [Davis]
- TE-CC mode w/4U 1957-11 [Schulz].
- Cygnus X-1 "all flying observatories" campaign [Talk by Hanke at *First Decade...*]
 - * "HETG was *crucial* for modeling the forest of ionized absorption" [Nowak]

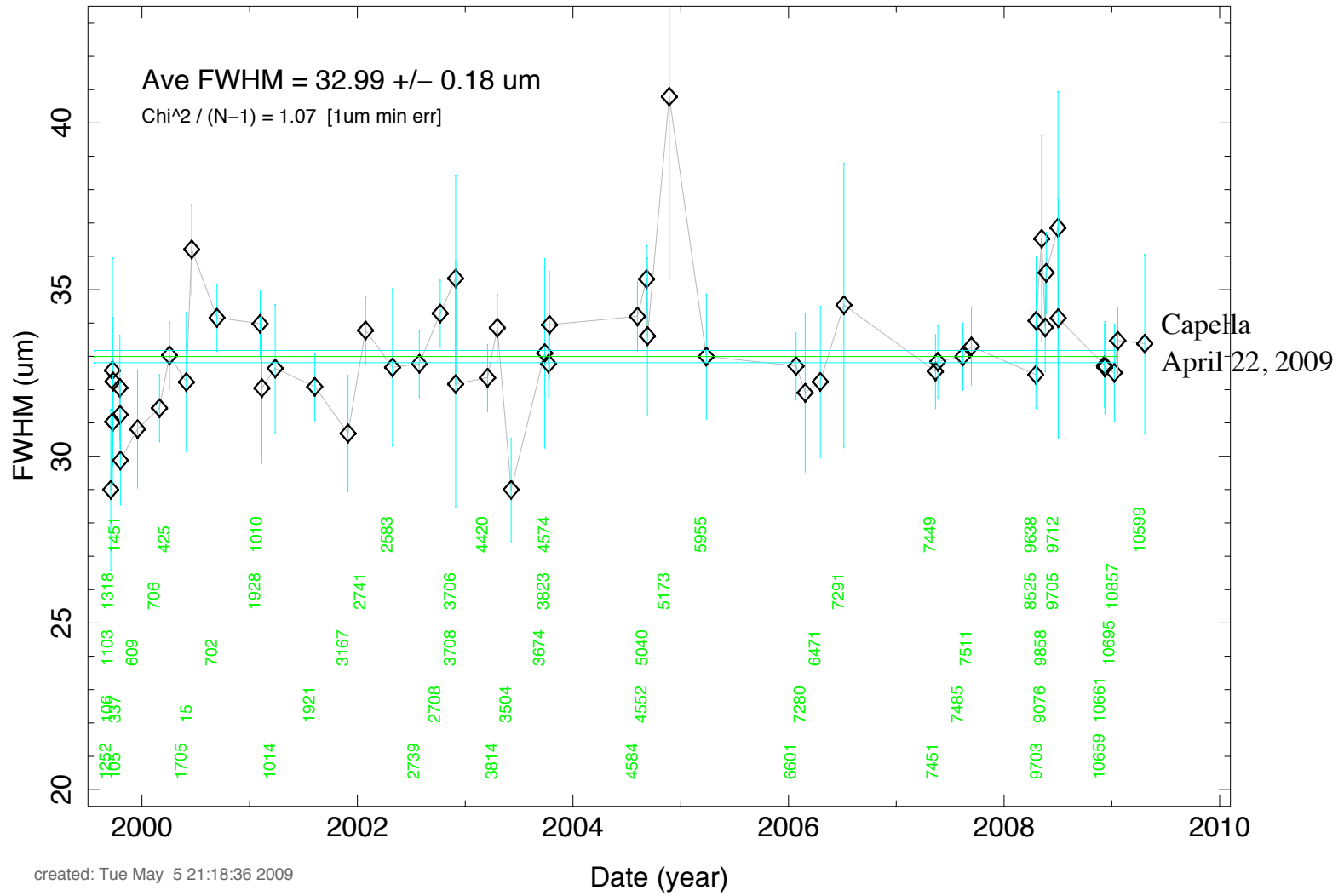
Chandra, XMM-Newton,
Suzaku, RXTE,
Integral, & Swift



<http://chandra.harvard.edu/photo/2009/cygx1/>



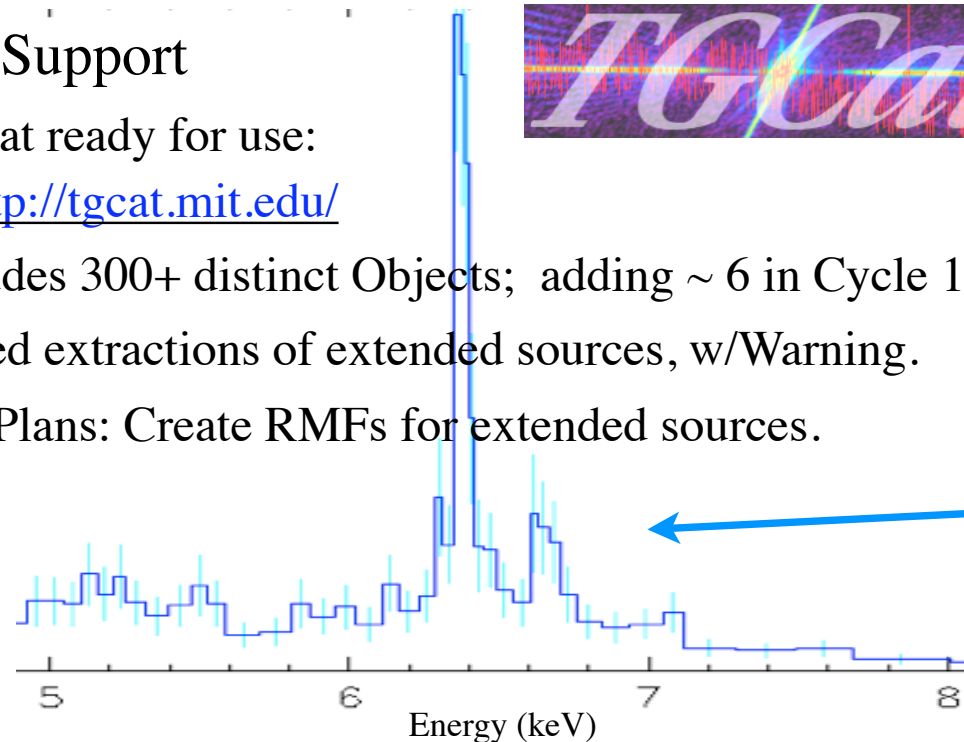
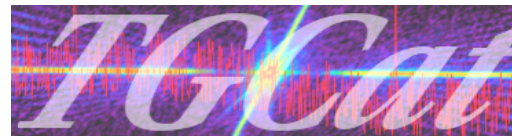
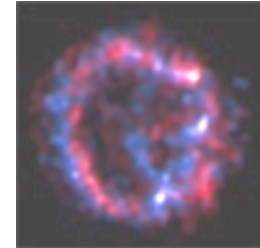
FWHM of HETG Streak Core vs Time (TGCat processed)



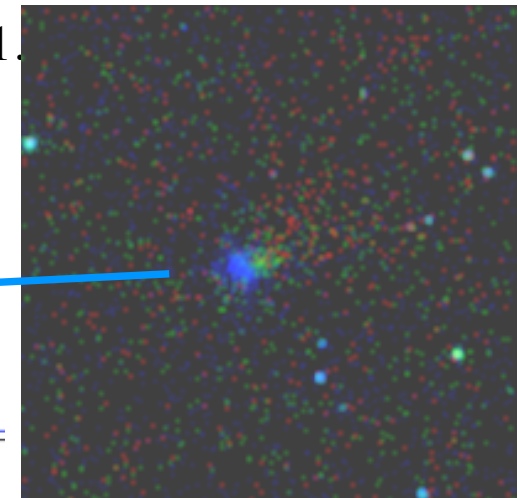


Ongoing HETG Team Activities, cont.

- Science Support to CXC, etc.
 - Participated in Peer Review & SNR/PWN Meeting
 - Contribute to [E0102 PR 7/23/09](#)
 - TGCat Support
 - * TGCat ready for use:
<http://tgcate.mit.edu/>
 - * Includes 300+ distinct Objects; adding ~ 6 in Cycle 11.
 - * Added extractions of extended sources, w/Warning.
 - * Plans: Create RMFs for extended sources.



NGC 4945





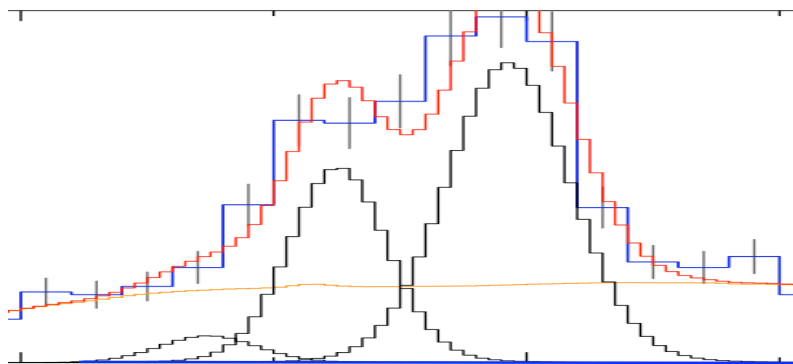
Ongoing HETG Team Activities, cont.

- GTO Science Program
 - Cycle 10:
 - ✓ AGN, Ark 564 (250 ks); XRB/IGM, 4U 0614+091 (200 ks)
 - ✓ Flare star, EV Lac (100 ks); XRB: 4U 1556-60 (32, 40 ks)
 - XRB: GX 5-1 (4x 8 ks: three are done, one 8 ks left)
 - Cas A "HETG-II": 8.5-years-later (70 ks) ~ January 2010
 - Cycle 11:
 - AGN: ESO 323-G077 (300ks) & NGC 2992 (150 ks)
 - XRB: GX 13+1 (5x 30 ks); T-Tauri binary: TWA 19A (60 ks)
 - Postdoc status:
 - * One PD 'graduated', in keeping with our plans.
 - * Contract funding supports 2 HETG Postdocs in coming years.

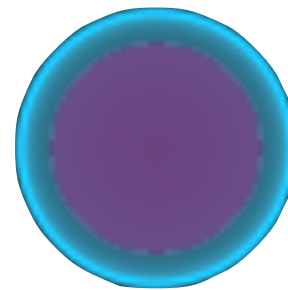
Science: SN 1996cr Changes in a Decade

- SN 1996cr exploded around time of XRCF testing...
- Near Circinus Galaxy: HETG-observed in 2000 & 2004
- '96cr and SN 1987A are unique SN: having *increasing* flux at years after explosion: bubble - shell CSM model (V.V. Dwarkadas).
- But, '96cr is 75 times farther: $\sim 0.01''$ dia. -- a point source to Chandra.
- Deep GO (F.E. Bauer) HETG observation at ~ 2009.0
- HETG data constrains model, see poster at

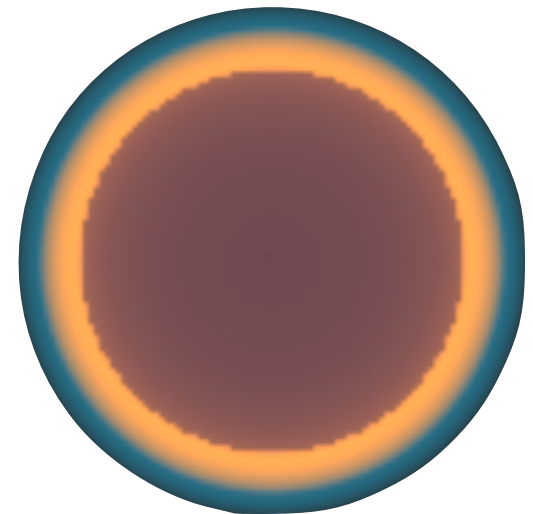
Chandra's First Decade of Discovery !



HETG



**Model:
year 2000**



Model: year 2009