CHANDRA HETG Observations at high X-Ray Fluxes

CC-mode vs. TE mode calibration

and

effects of dispersed secondary images

9th IACHEC, Warrenton VA, May 13 2014

Grating Configuration and Calibration Sources

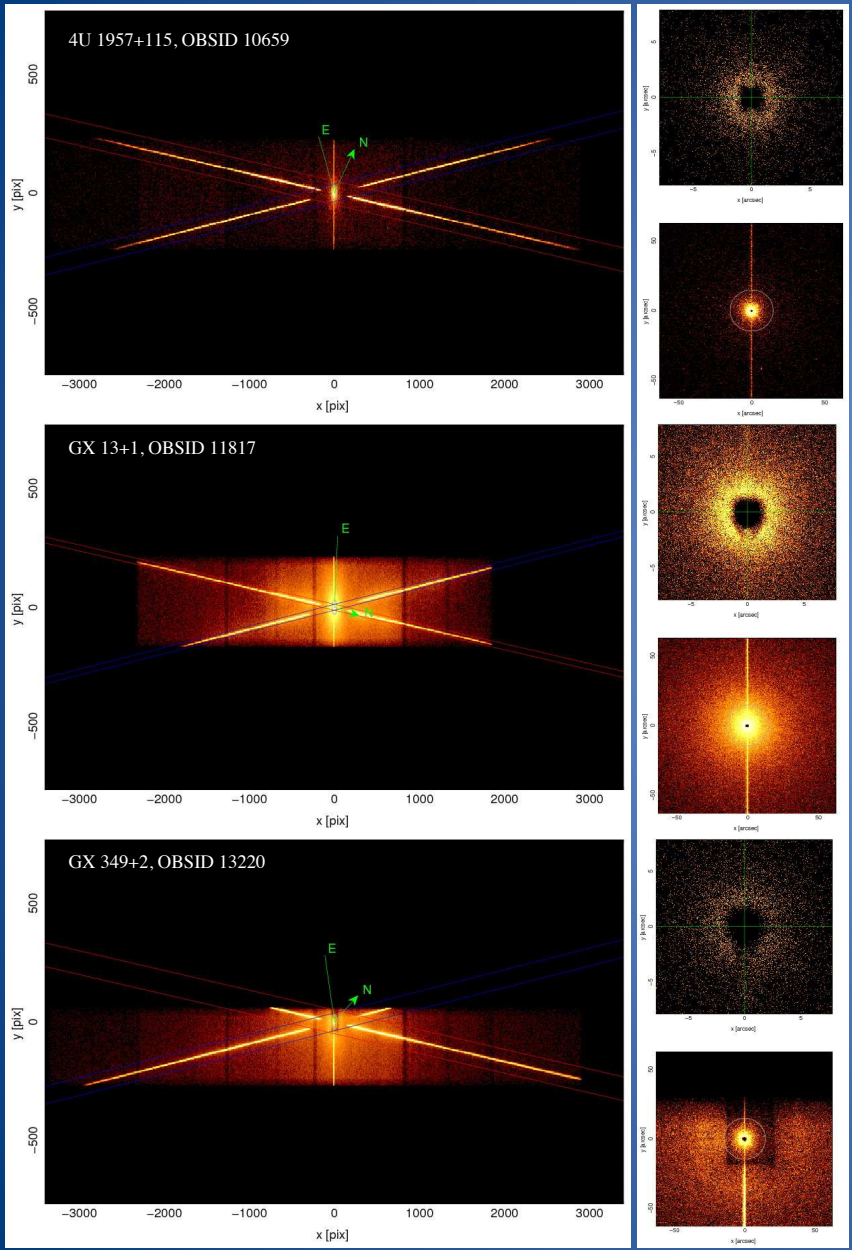
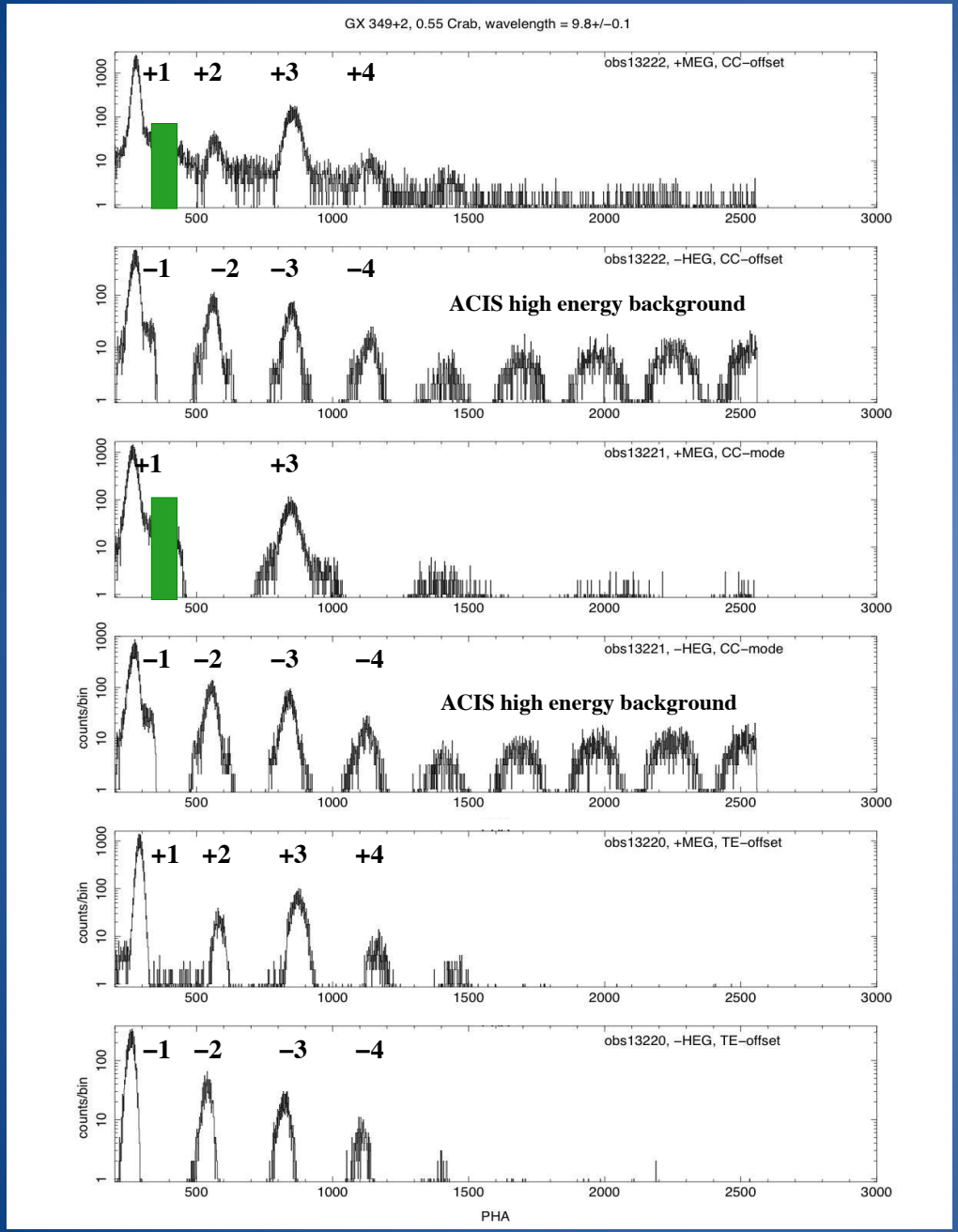


TABLE 1 CALIBRATION SOURCE PROPERTIES

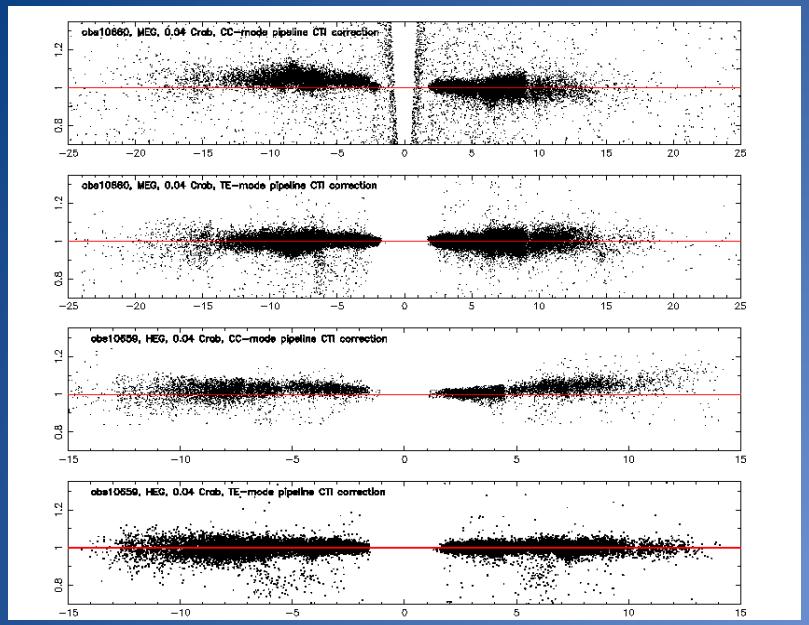
Sources	Obsids	Flux (1)	Flux (2)	N_H (3)	exposure (4)	Mode	Subarray	Z-Sim (5)
4U 1957+115	10659	35	0.80	0.15	10	TE	15, 440	-6.8
	10660		0.80	0.15	20	CC	–	-6.8
	10661		0.80	0.15	10	TE	15, 440	-6.8
4U 1728-34	2748	85	2.00	2,51	30	TE	1, 400	-7.49
	6567		2.00	2,51	160	CC	–	-4.0
GX 13+1	11817	330	7.94	3.16	30	TE	1, 350	-8.0
	11818		7.94	3.16	30	CC	faint	-8.0
	13197		7.94	3.16	10	CC	graded	-8.0
GX 349+2	12199	660	15.8	1.99	20	CC	–	-6.14
	13220		15.8	1.99	20	TE	1, 300	-11.3
	13221		15.8	1.99	40	CC	–	-6.14
Cyg X-2	8170	540	13.2	0.32	70	CC	–	-6.14
	8599		13.2	0.32	70	CC	–	-6.14
	10881	340	8.2	0.32	100	CC	–	-6.14
GX 5-1	5888	700	17.0	3.36	50	CC	–	-11.3

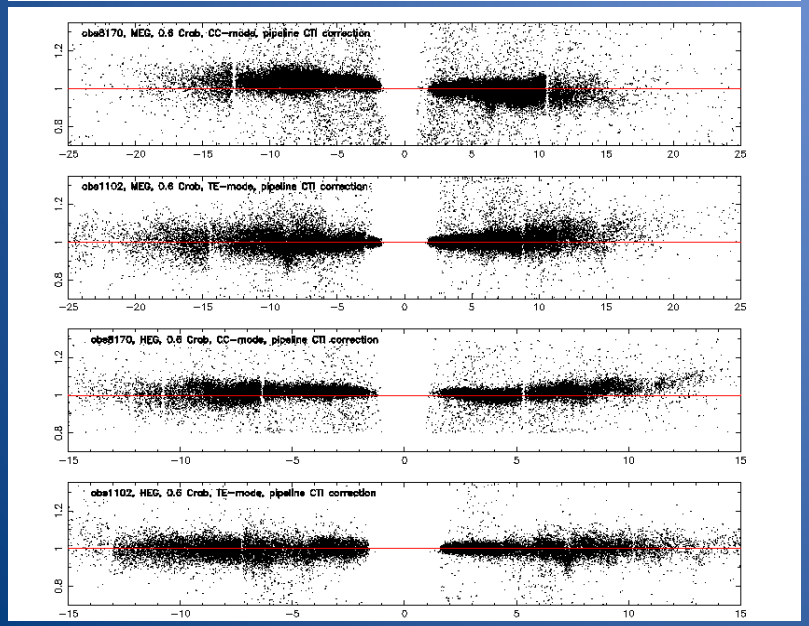
nCrab], (2) [10^9erg cm^{-2} s^{-1}], (3) [10^{22} cm^{-2}], (4) [ks], (5) [mm]

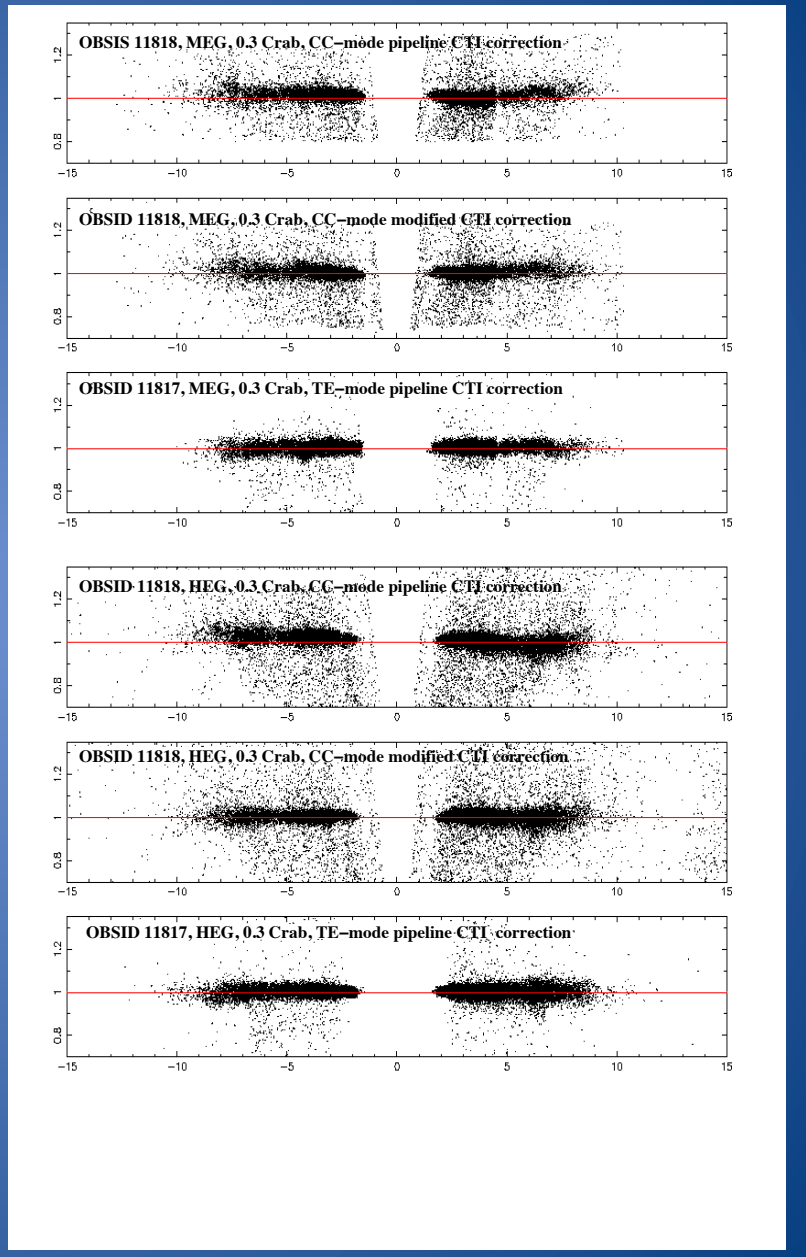
Higher orders in CC-Mode



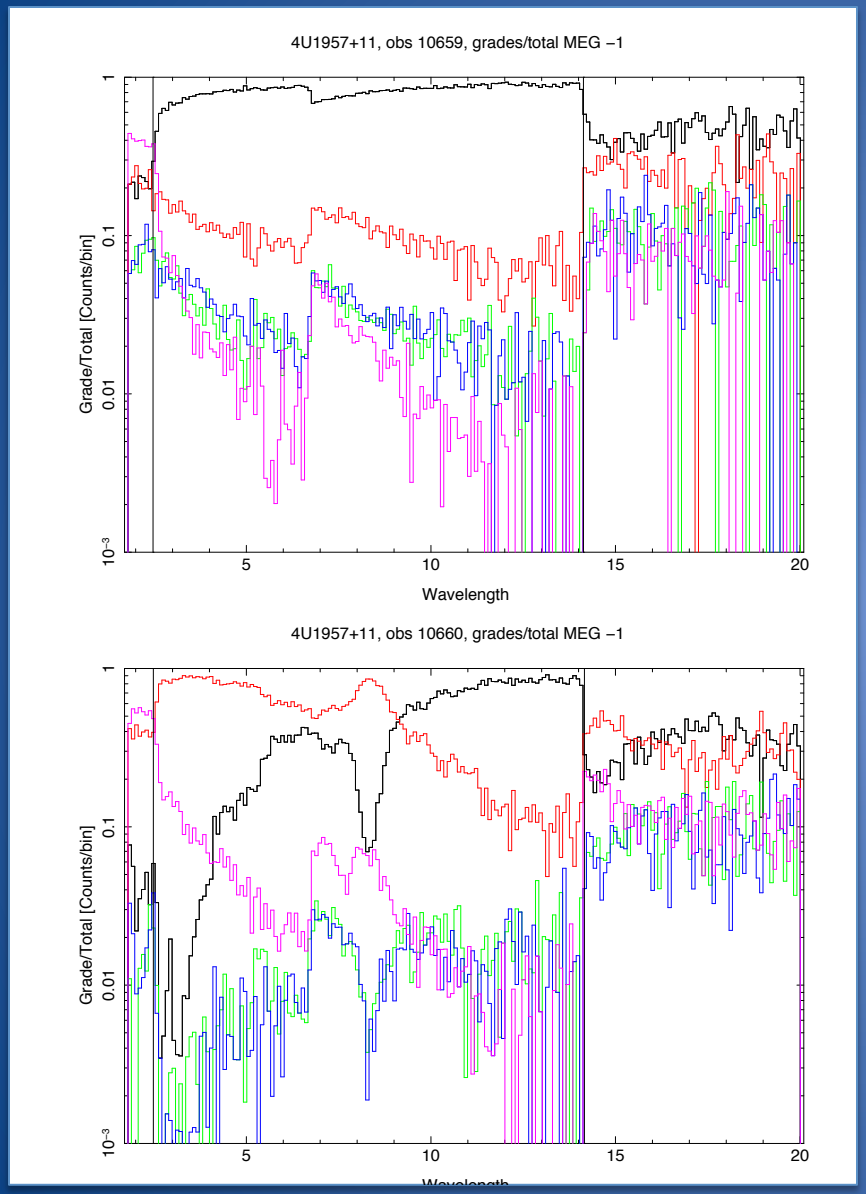
ACIS calibration: energy scale and gain

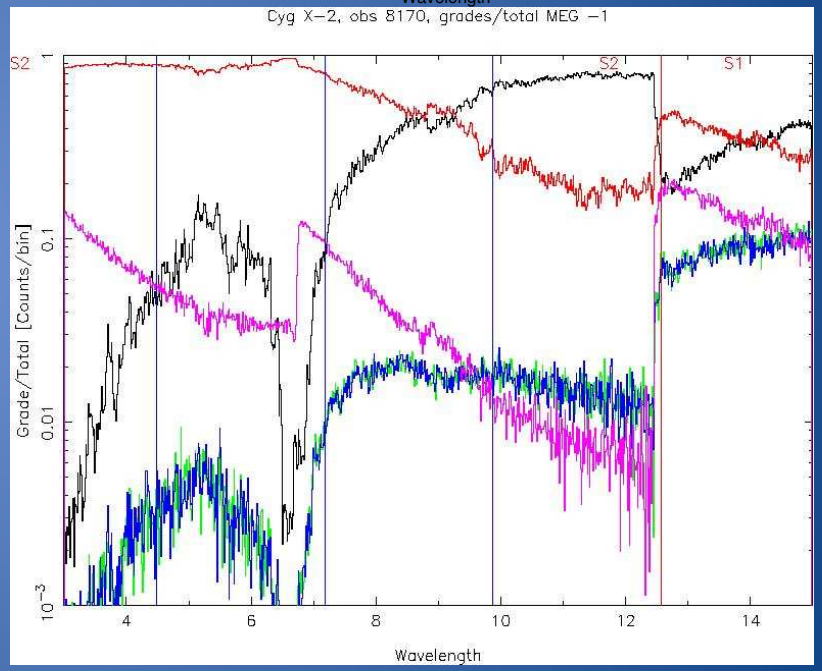


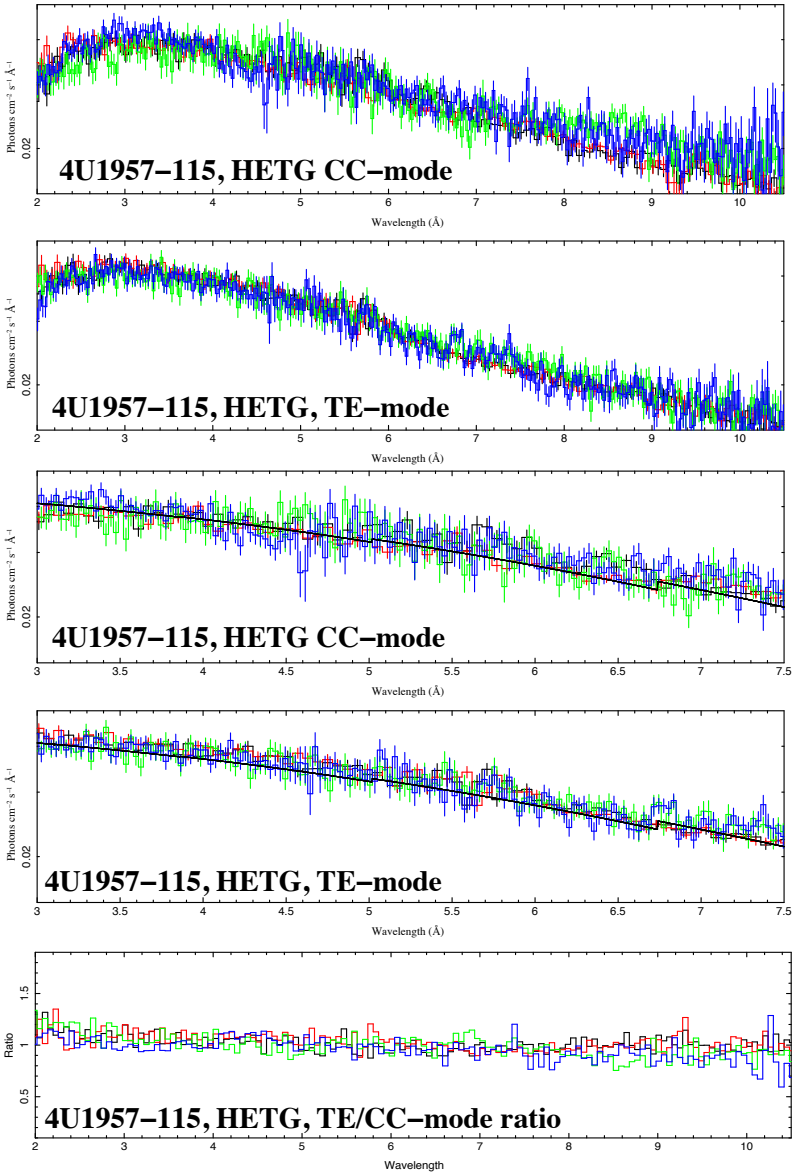




ACIS calibration: grade distributions

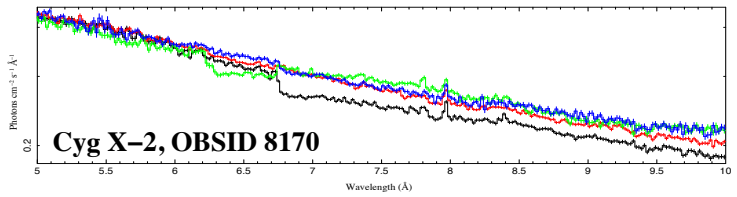


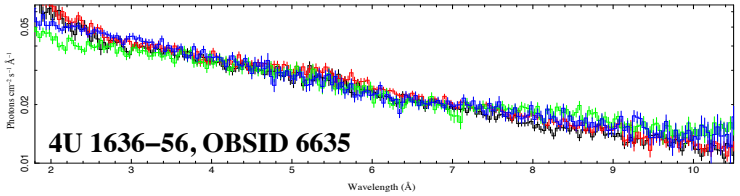


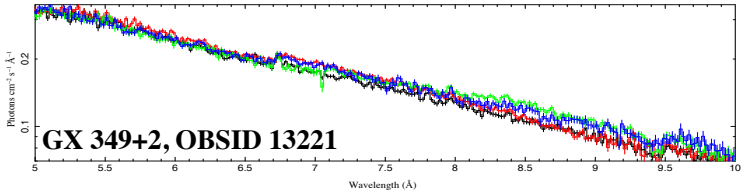


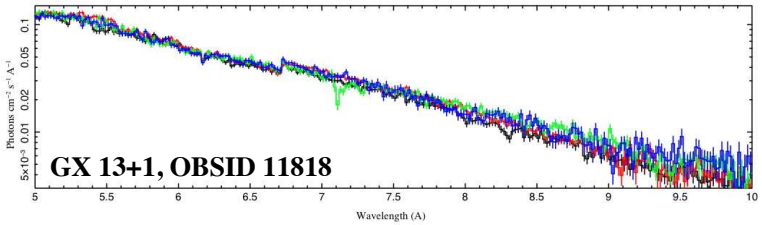
HETG spectra of fluxes < 35 mCrab

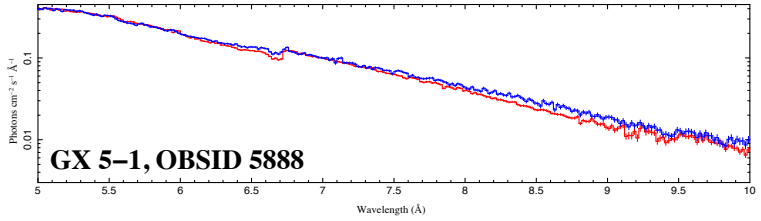
HETG spectra of very bright sources

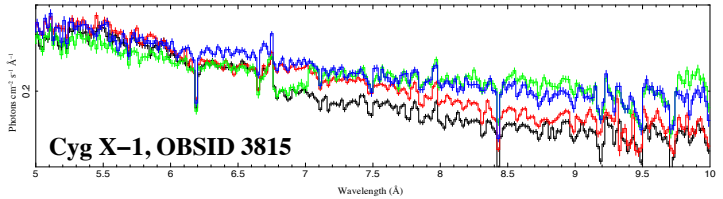


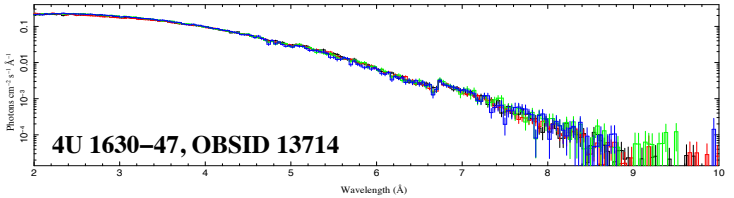


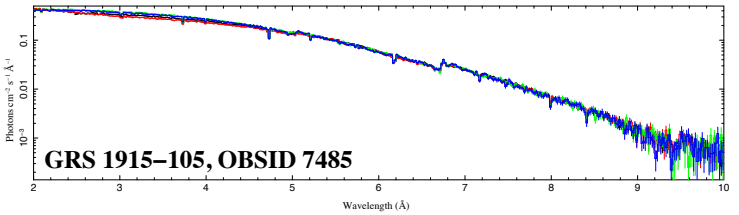


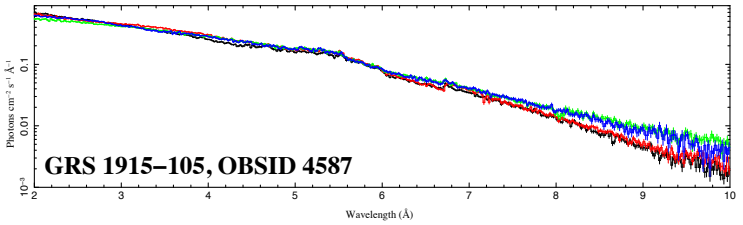


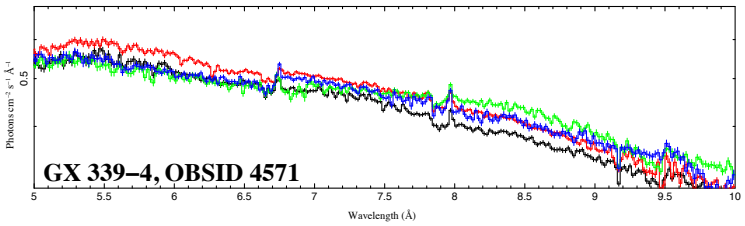




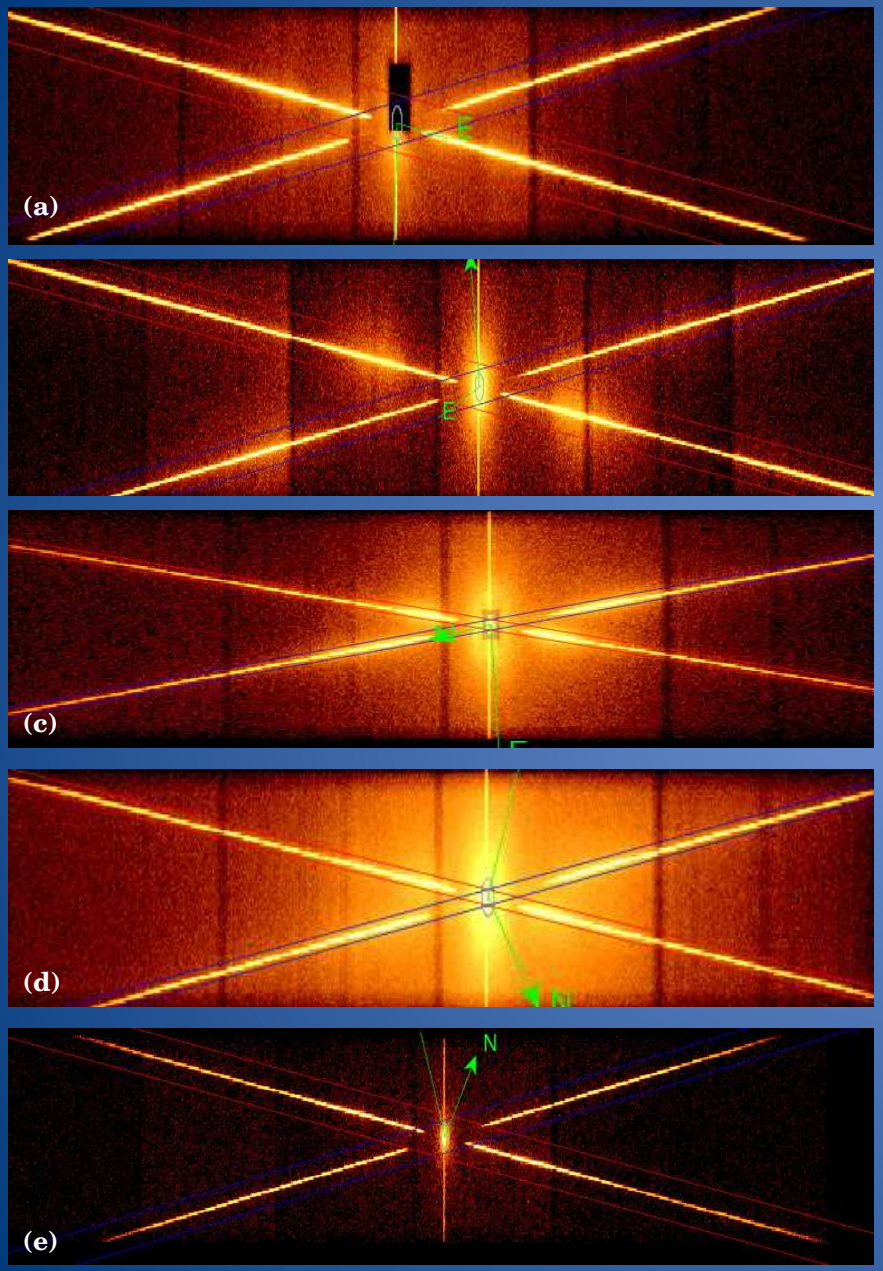


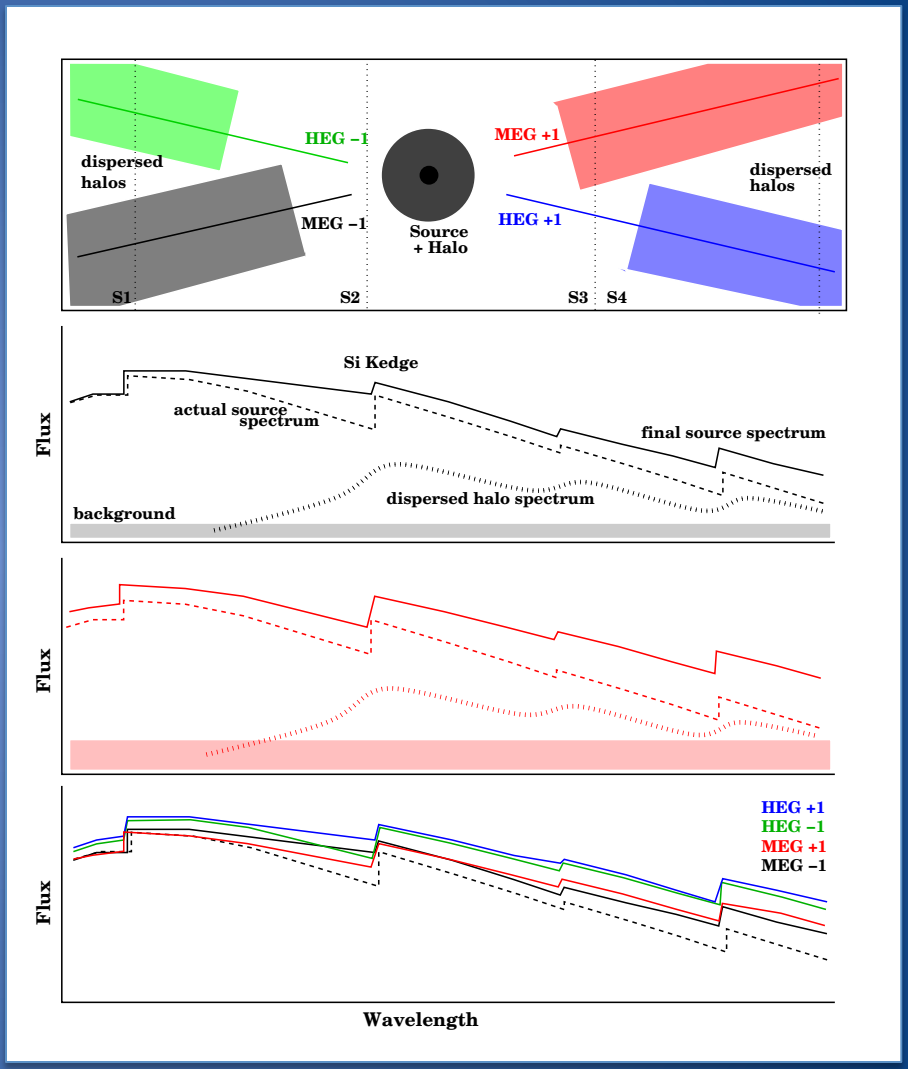




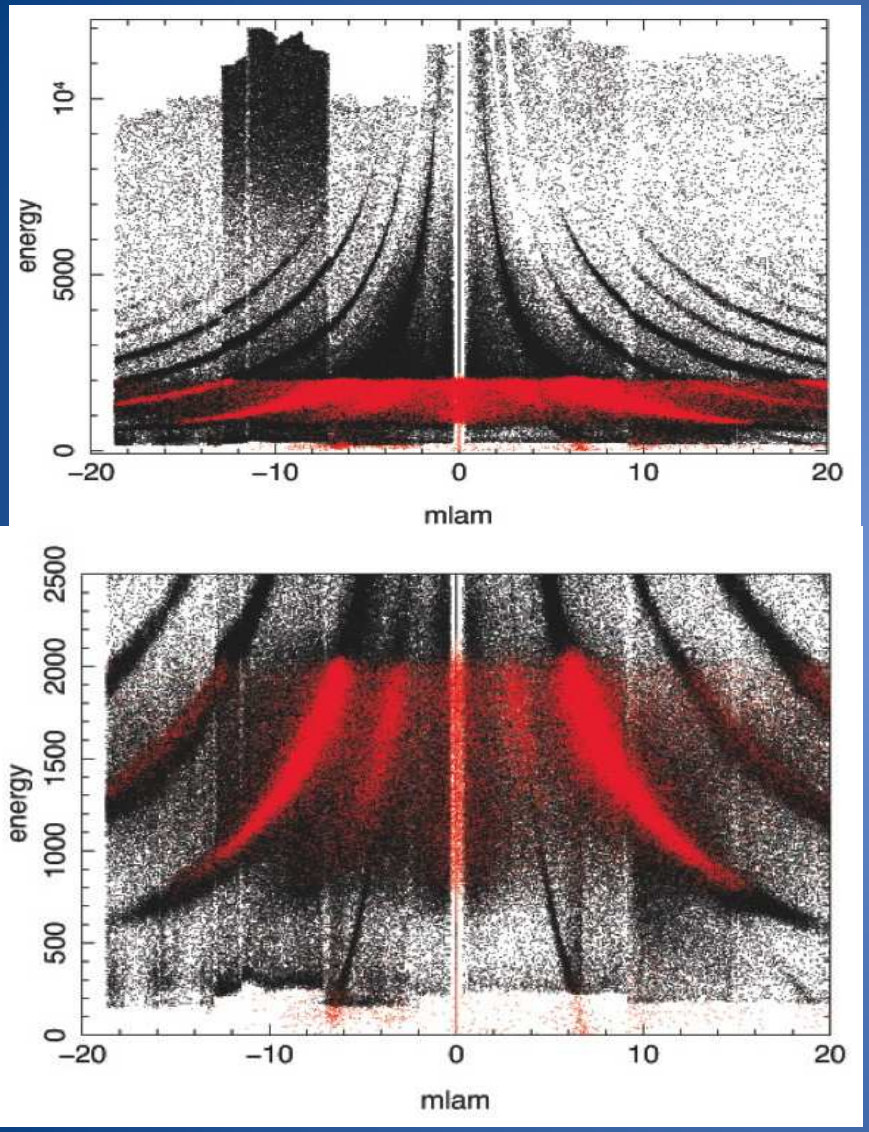


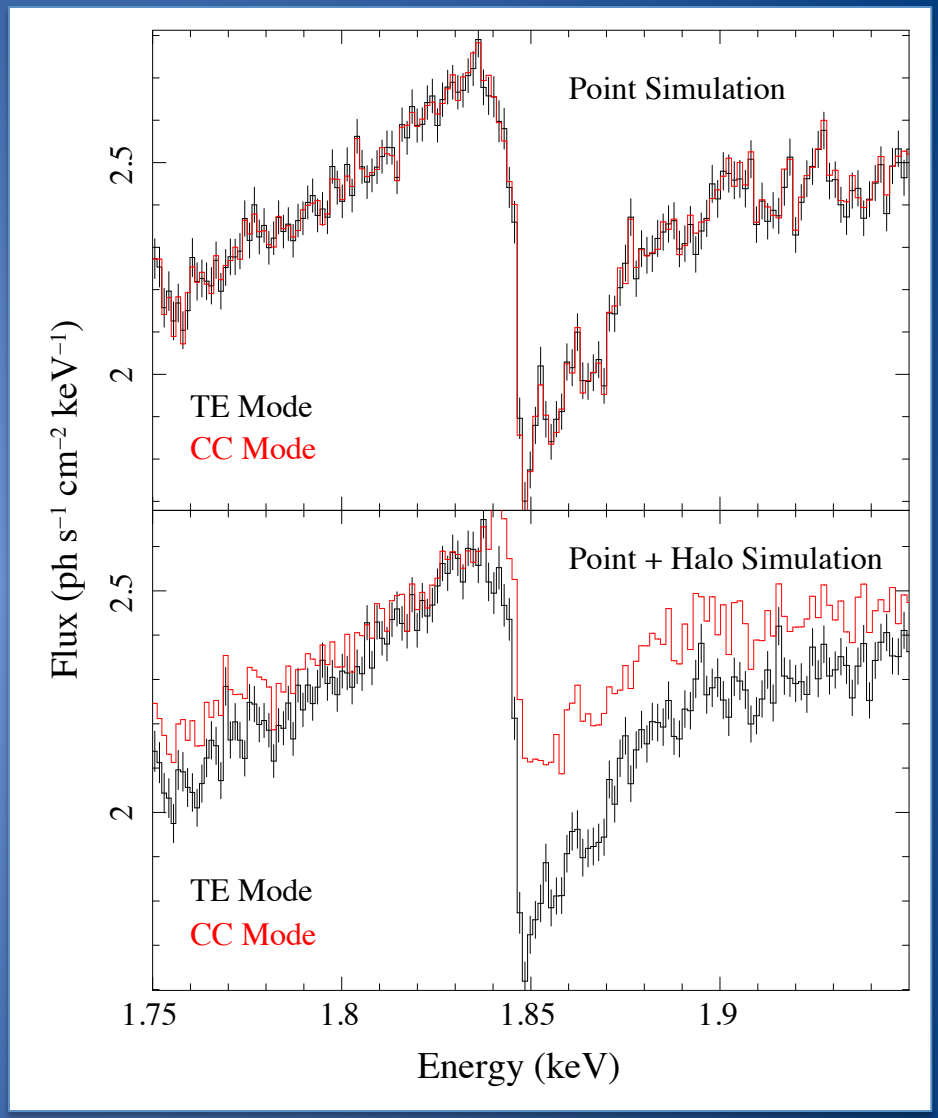
Collapsed dispersed images: scattering halos



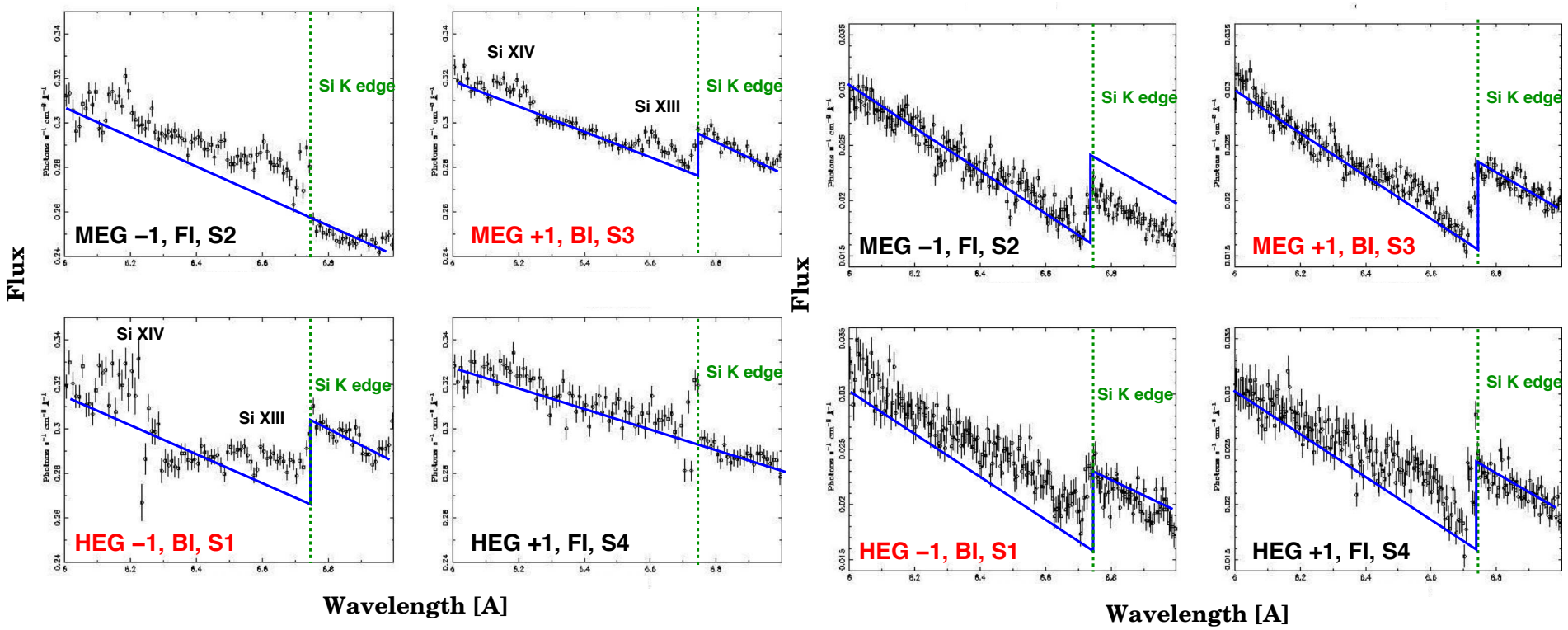


Scattering halo effect and Si K edge

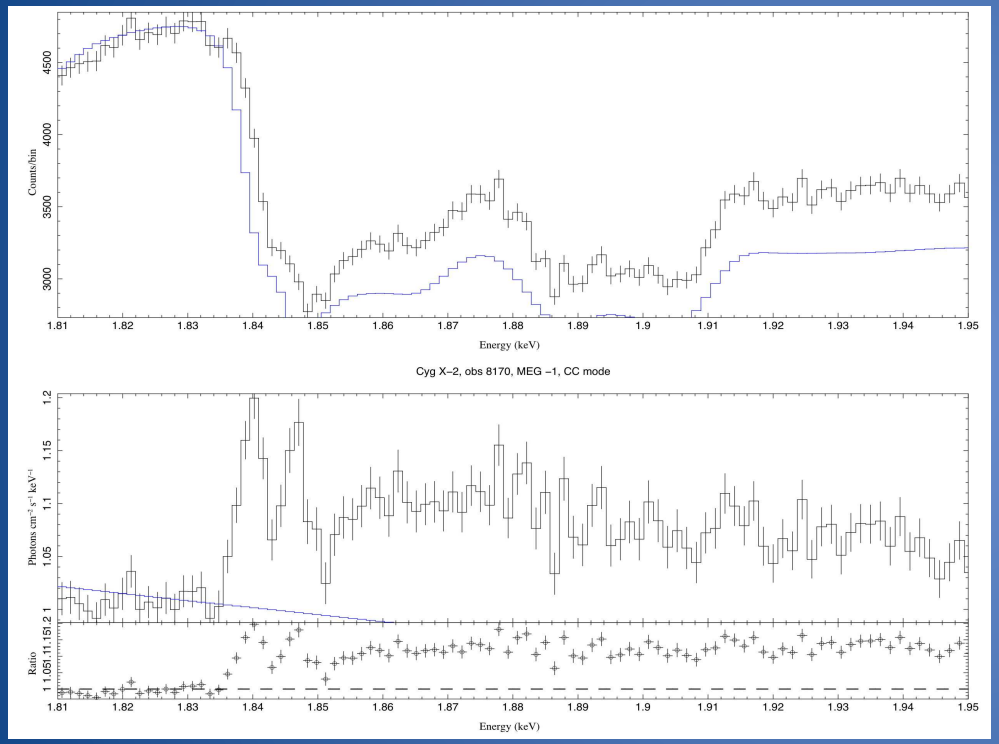


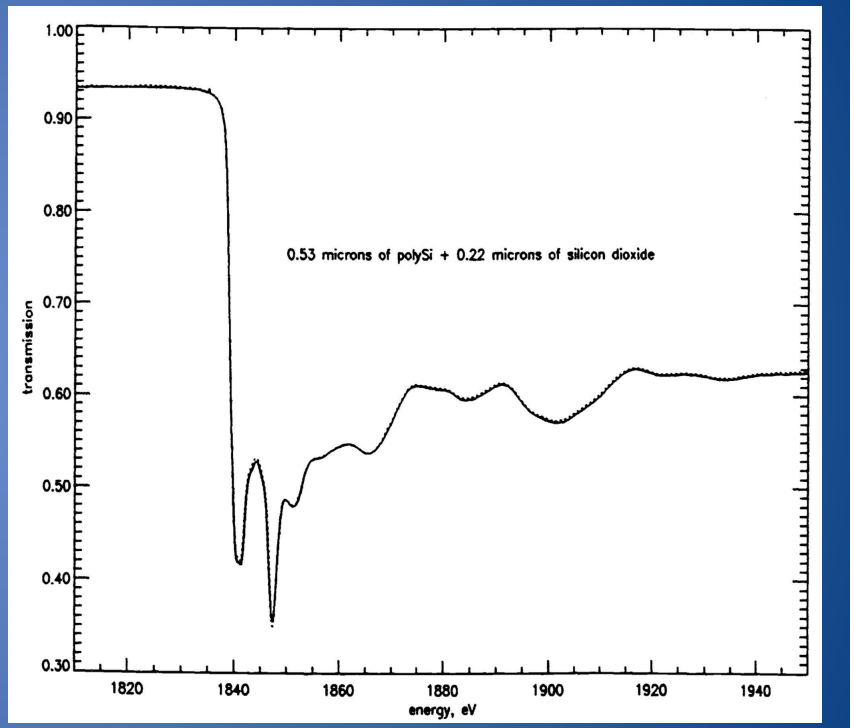


Si K edge at low and high absorption



Instrumental Si K edge correction in front-illumination devices





Conclusions:

- Calibration of ACIS in CC-mode generally does not deviate from TE-mode
- The Si K edge in FI devices has Si O_2 XAFS imprints, BI devices have not
- The Si K edge is optical depth is affected by collapsed dispersed scattering halos
- The full callapsed dispersed imaged in CC-mode alters the original point sources spectrum and requires additioanl science modeling
- Higher order background overlaps can be avoided by moving two grating arms of the array
- CC-mode background is significant but can be dealt with is several ways

Problems in bright HETG spectra are not ACIS calibration related but require intensive additional modeling and data reduction depending on chosen configurations