High resolution X-ray spectra of Seyfert 1 galaxies

(Progress Report)

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Objetives

Analyse soft X-ray spectra (6-30Å) of a sample of Seyfert 1 galaxies

- ✓ Identify possible emission and absorption features
- ✓ What are the characteristics of the continuum emission?
- ✓ Where do the emission lines come from?
- ✓ What are the physical parameters of the gas where the lines are originated?
- ✓ Is there any relationship between “X-ray gas” and gas “at other wavelengths”?

Target selection criteria

- Seyfert 1 galaxies in the Veron & Veron catalogue (2001 A&A.374.92V)
- observed by *ROSAT* and brighter than 0.85 counts/s in the *ROSAT* Bright Source Catalogue
- with low column densities (nH $\sim 10^{20}$ cm^{-2})

The selection of bright objects with low column density was made to ensure good signal-to-noise in the soft X-rays spectra

Our Data

High resolution spectra obtained with the Reflection Grating Spectrometer (RGS) on board the XMM-Newton satellite

- ESO 359-G19 (z=0.056 nH=1.02×10^{20} cm^{-2})
- HE 1143-1810 (z=0.033 nH=3.44×10^{20} cm^{-2})
- CTS A08.12 (z=0.030 nH=4.07×10^{20} cm^{-2})
- MKN 110 (z=0.035 nH=1.42×10^{20} cm^{-2})

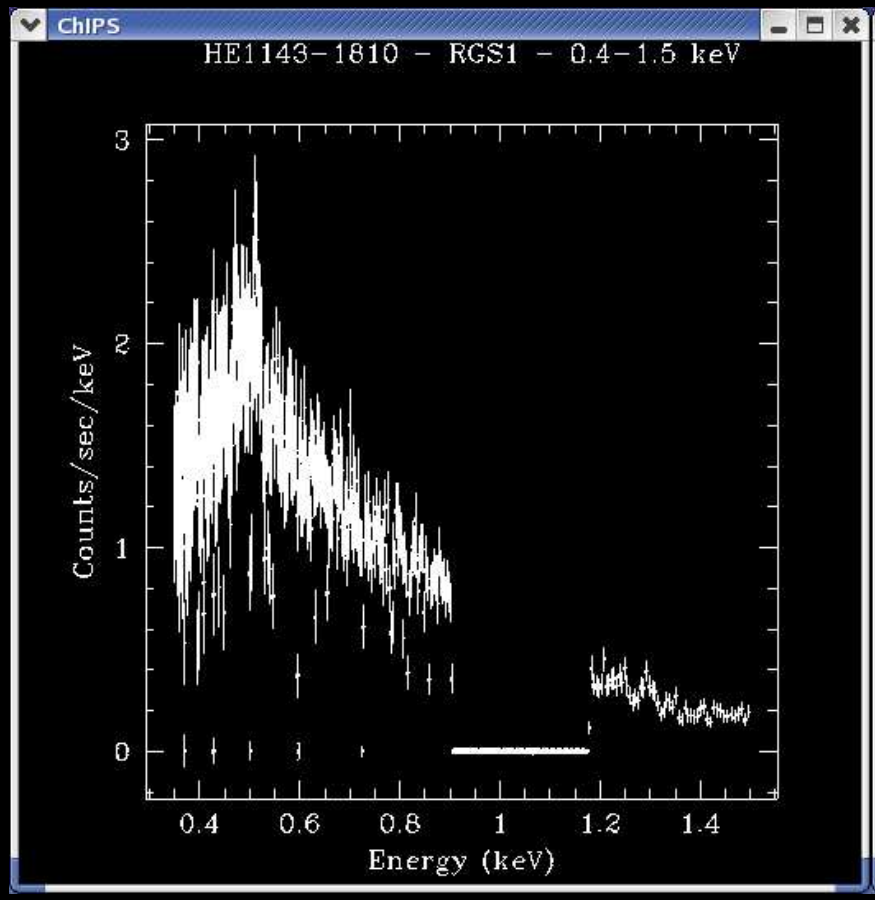
(we have also simultaneous UV, optical data taking with the optical monitor (OM) and X-rays up to about 10 keV)

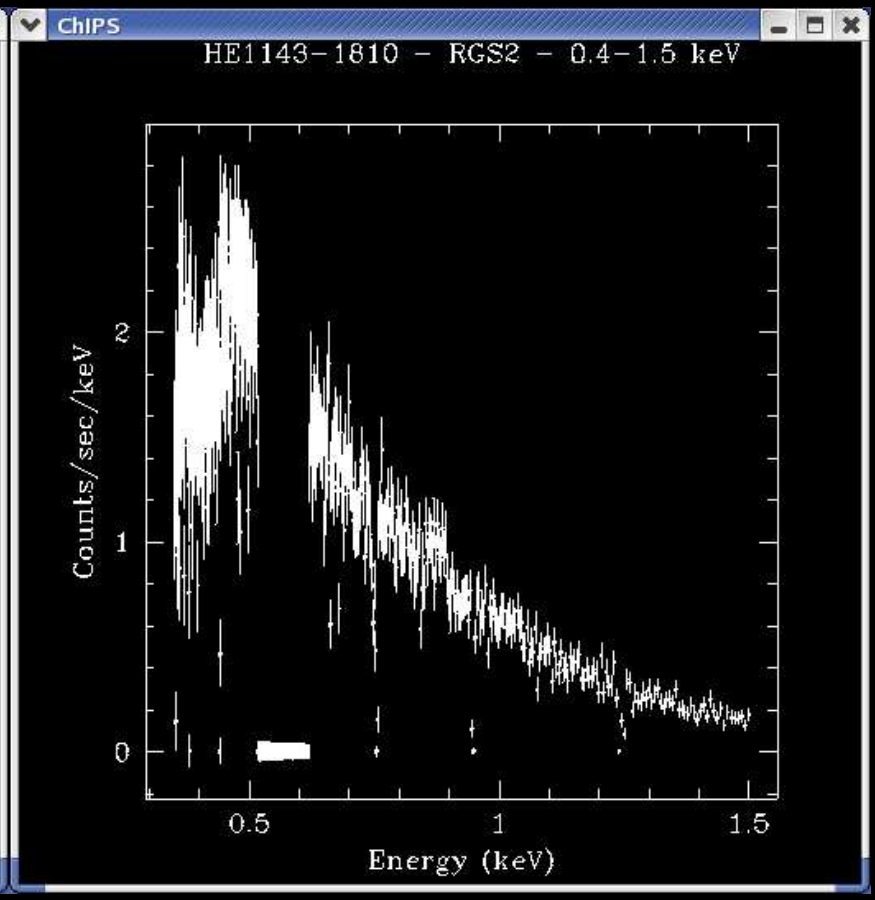
Instrument characteristics

		RGS1			RGS2		
		10 Å	15 Å	35 Å	10 Å	15 Å	35 Å
Effective area (cm^2)	1st order	51	61	21	53	68	25
	2nd order	29	15	-	31	19	-
Resolution (km s^{-1})	1st order	1700	1200	600	1900	1400	700
	2nd order	1000	700	-	1200	800	-
Wavelength range	1st order	5 - 38 Å (0.35 - 2.5 keV)					
	2nd order	5 - 20 Å (0.62 - 2.5 keV)					
Wavelength accuracy		$\pm$ 8 mÅ					
Bin size [3x3 $(27\mu)^2$ pixels]		2.5 arcsec (cross dispersion direction) 7 - 14 mÅ (dispersion direction, first order) 4 - 10 mÅ (dispersion direction, second order)					

State of the art

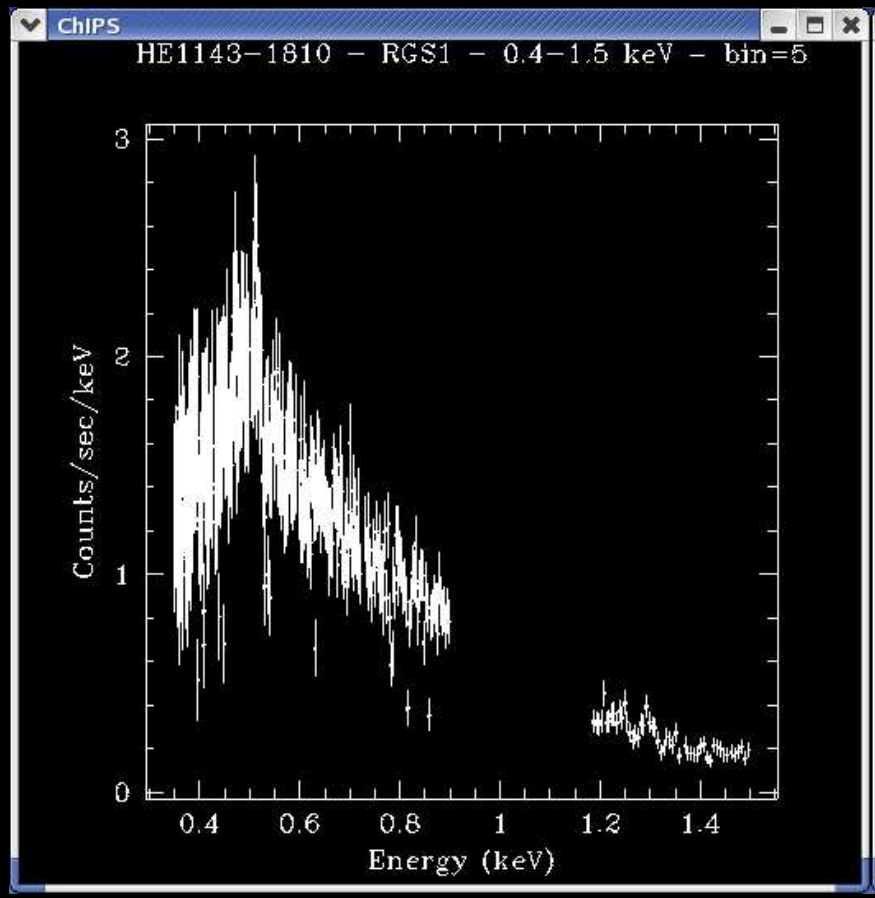
We had perform the first processing steps

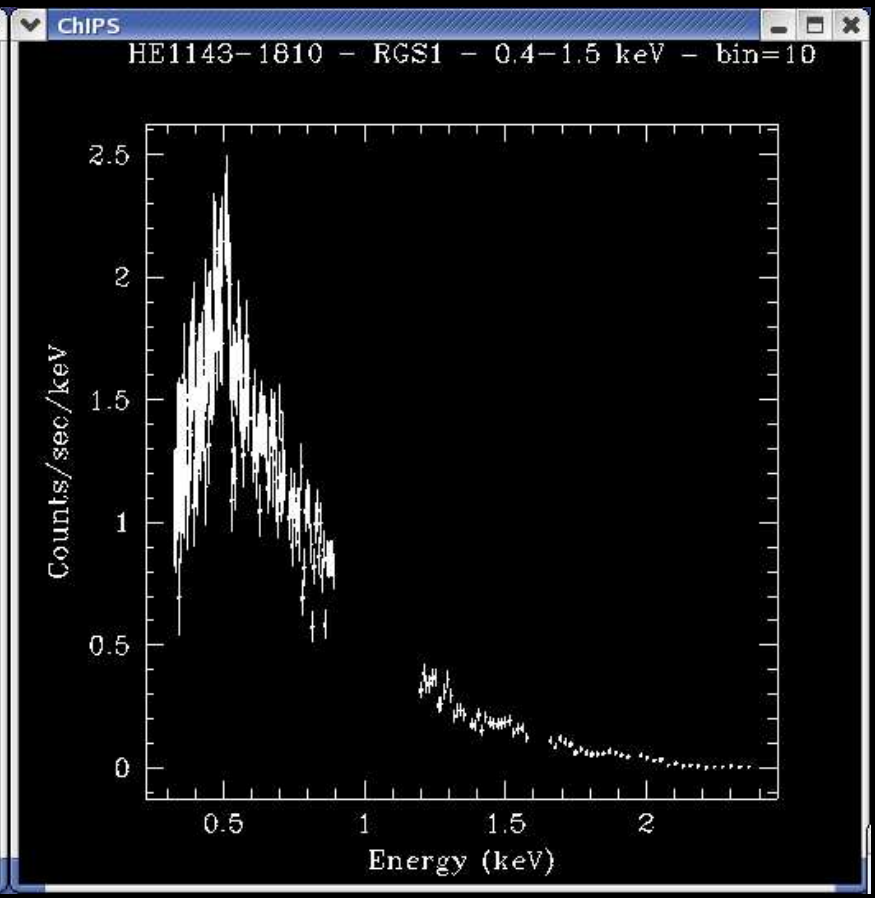




State of the art

Binning performance of different methods is under study

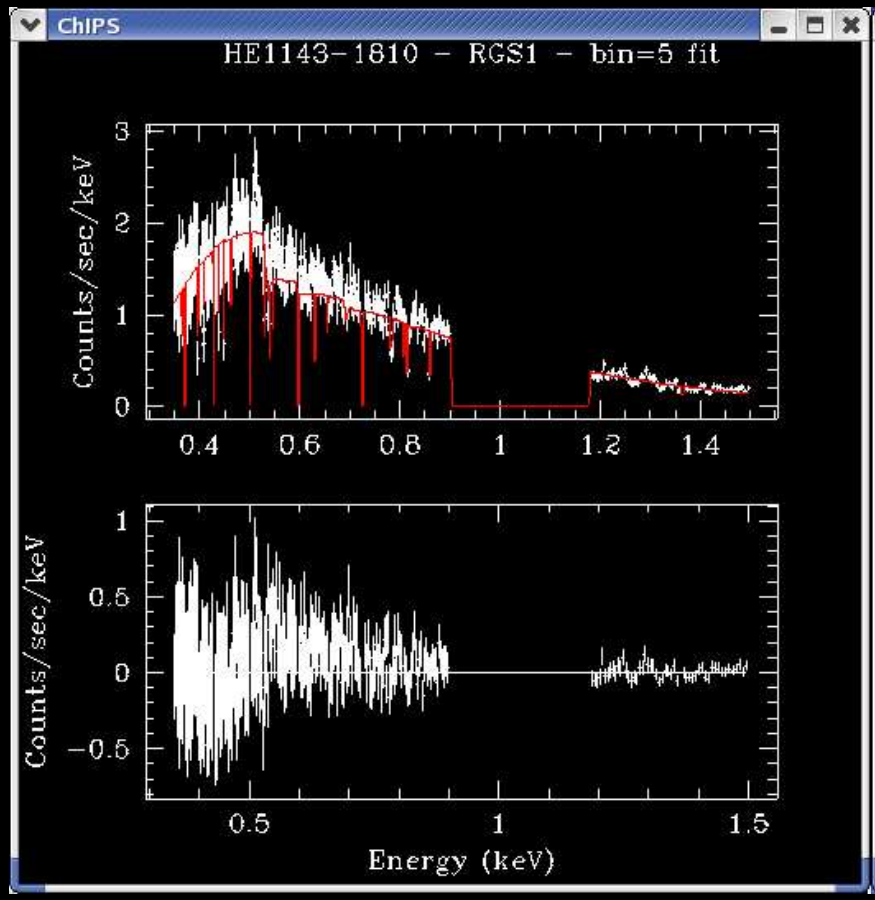


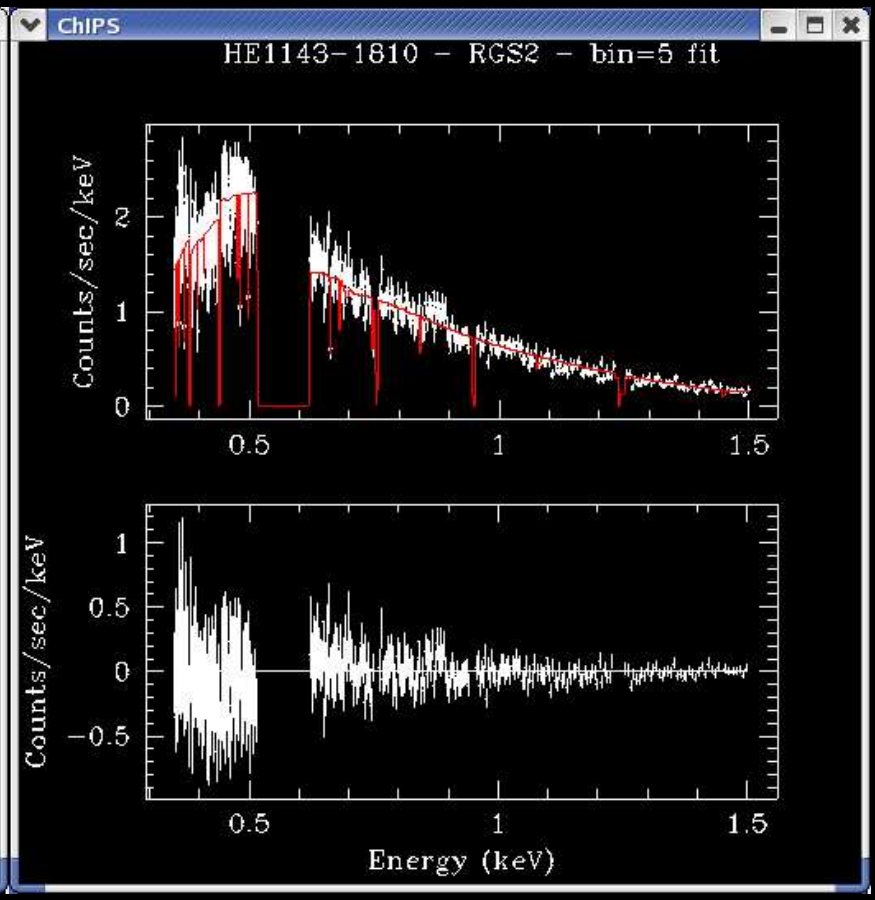


State of the art

We are in the begining of the fitting process

power law ⋆ photo-electric absorption ⋆ PHASE (Y. Kromgold)





XMM spacecraft

The two X-ray telescopes with Reflection Grating Arrays, are visible at the lower left. At the right end of the assembly, the focal instruments are shown: The EPIC MOS cameras with their radiators (black/green "horns"), the radiator of the EPIC p-n camera (violet) and those of the (light blue) RGS receivers (in orange). The black box at the bottom of the bus is the outgassing device.

