

A hard look at the CfA Seyfert-2 sample with *NuSTAR*

E. Kammoun¹ & J. M. Miller¹

¹Department of Astronomy, University of Michigan (ekammoun@umich.edu)



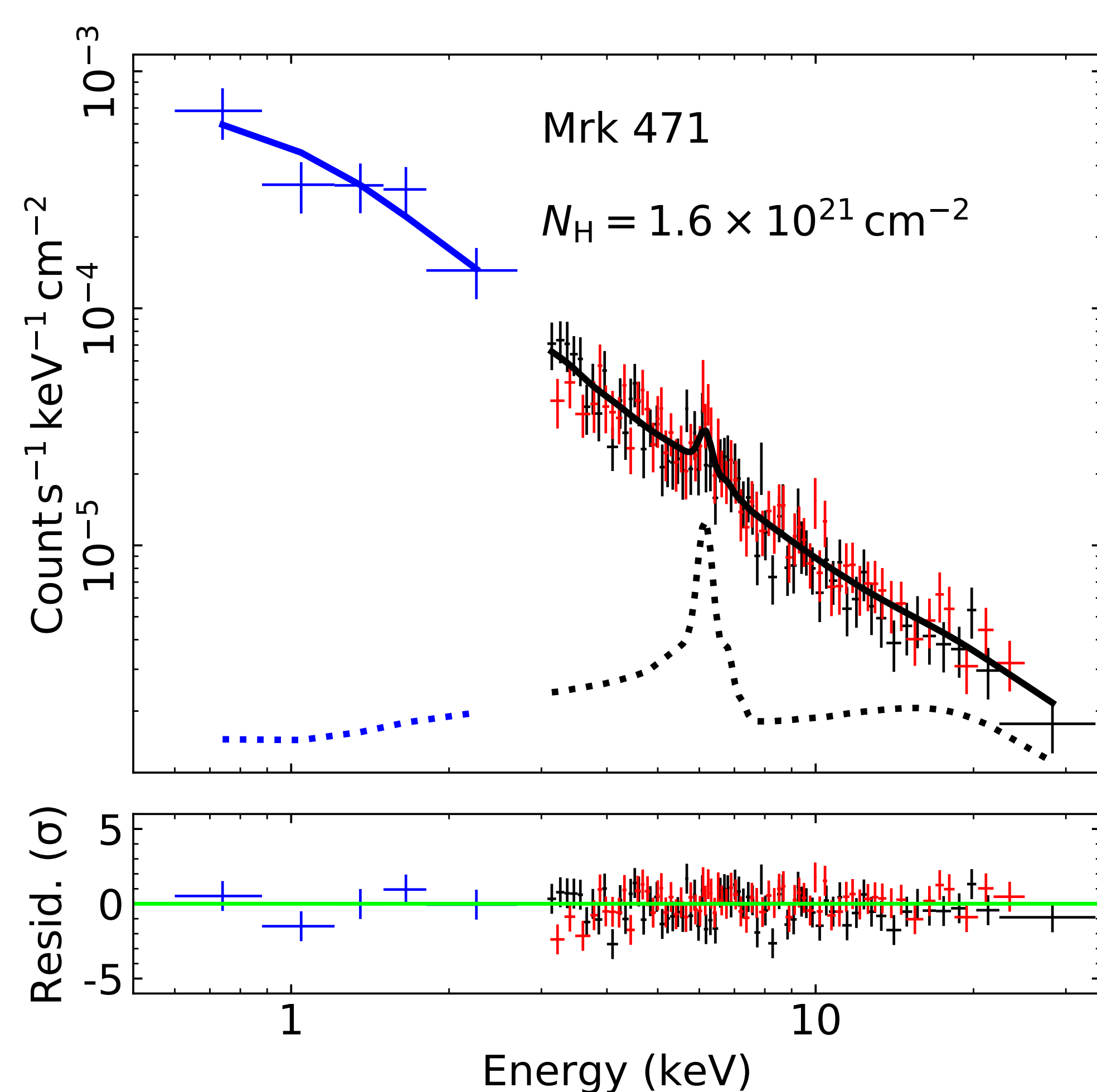
Objective

X-ray observations are one of the prime tools to understand the demographics of black holes, in particular their luminosity function, their environments, the location in epochs of the most rapid black hole growth, and the geometry of the accretion flows. A large fraction of black hole mass growth occurs in heavily obscured quasars at moderate redshifts. The local population of Compton-thick Seyfert-2 AGN represent the nearby lower-mass proxies of these sources. The sensitivity of *NuSTAR* allows us to identify and study these sources, by detecting the emission from the central engine above ~ 15 keV.

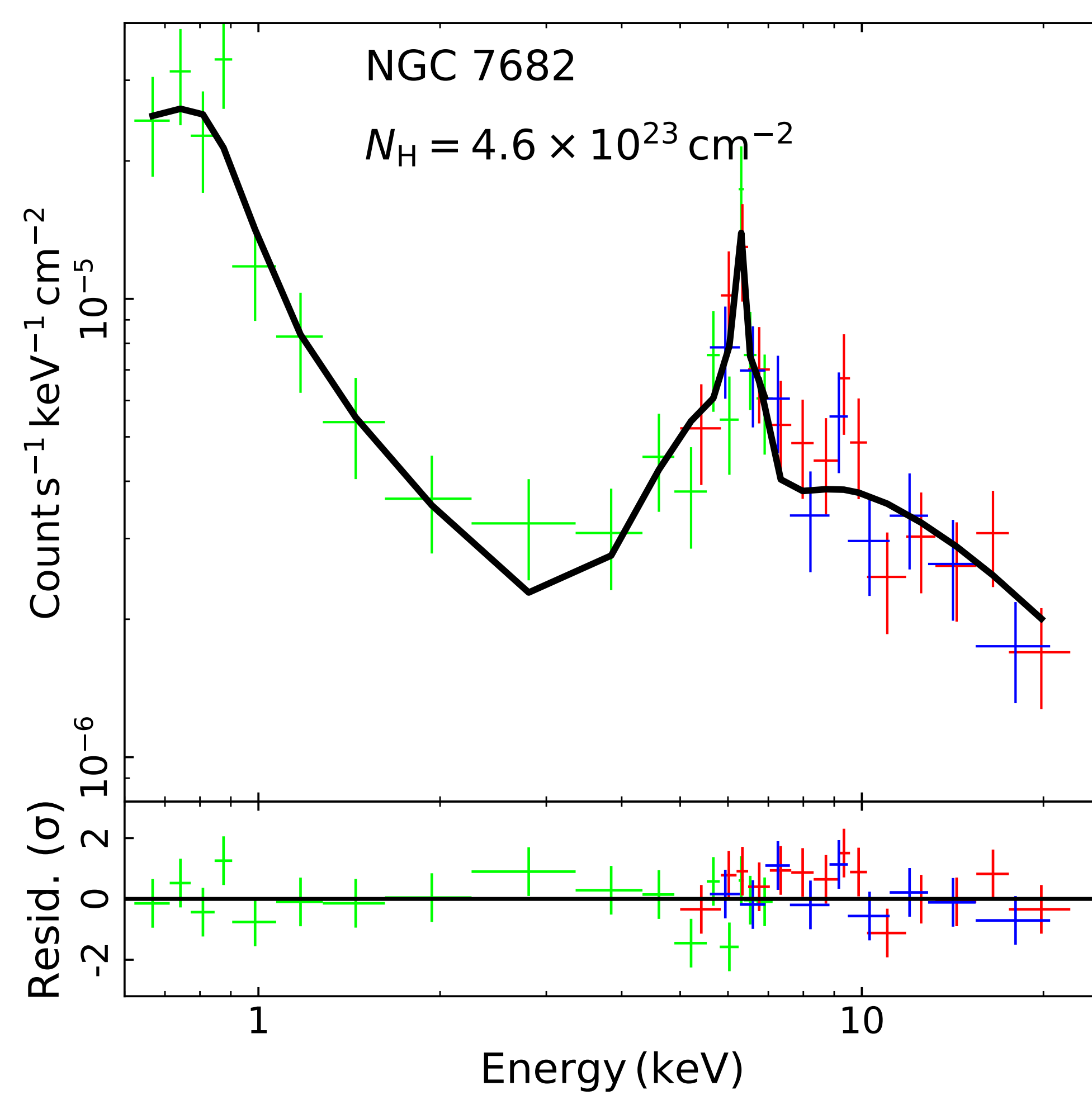
We are conducting a survey with *NuSTAR* with the aim to observe the **22 optically-selected Seyfert 2 galaxies** from the CfA Redshift Survey (Huchra et al. 1983, Huchra & Burg 1992). This survey aims to:

1. Characterize the distribution of obscuring columns in the local volume.
2. Measure the local X-ray volume emissivity at hard X-rays.

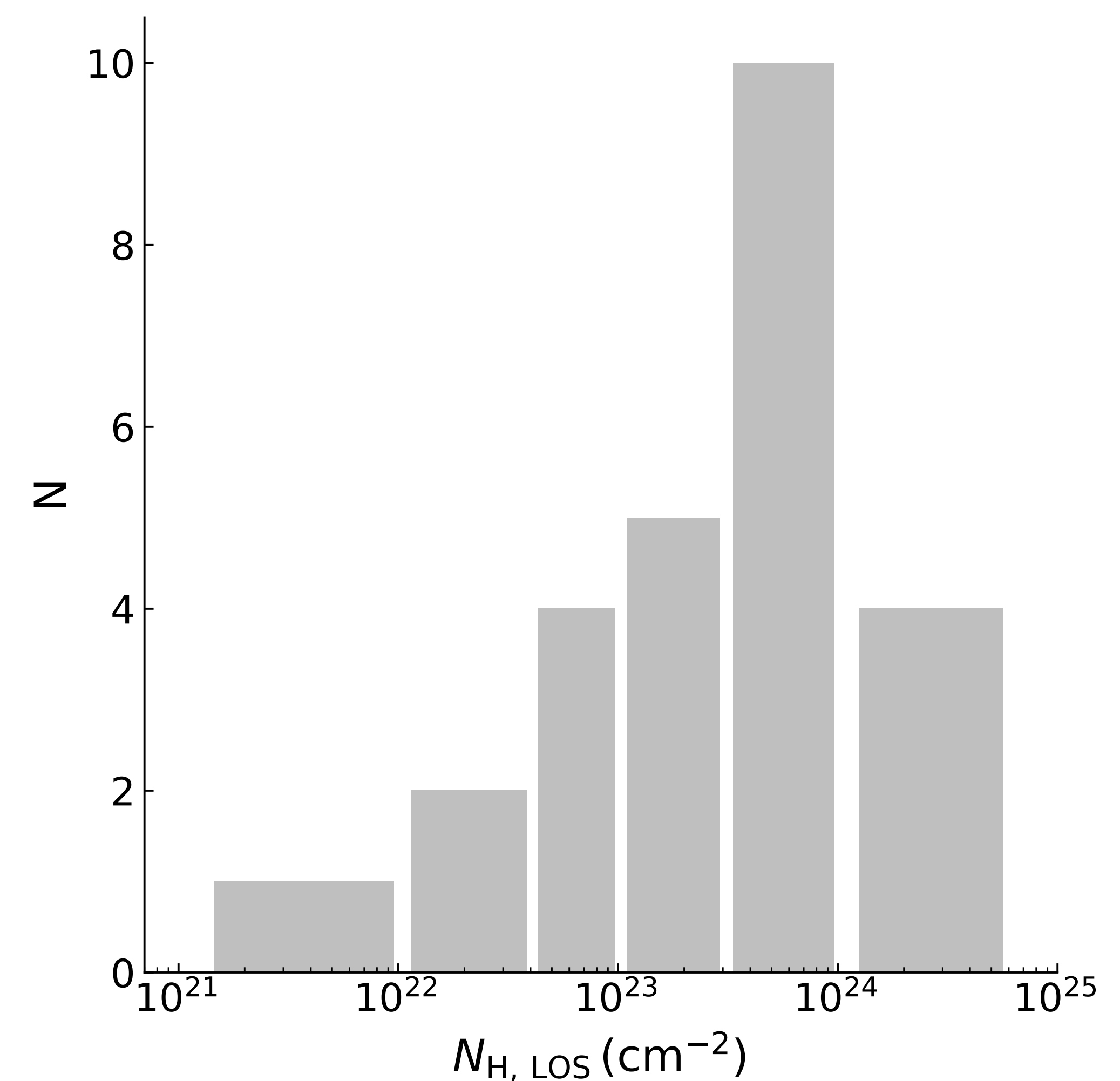
Preliminary Results



An example of a source with $N_H < 10^{22} \text{ cm}^{-2}$

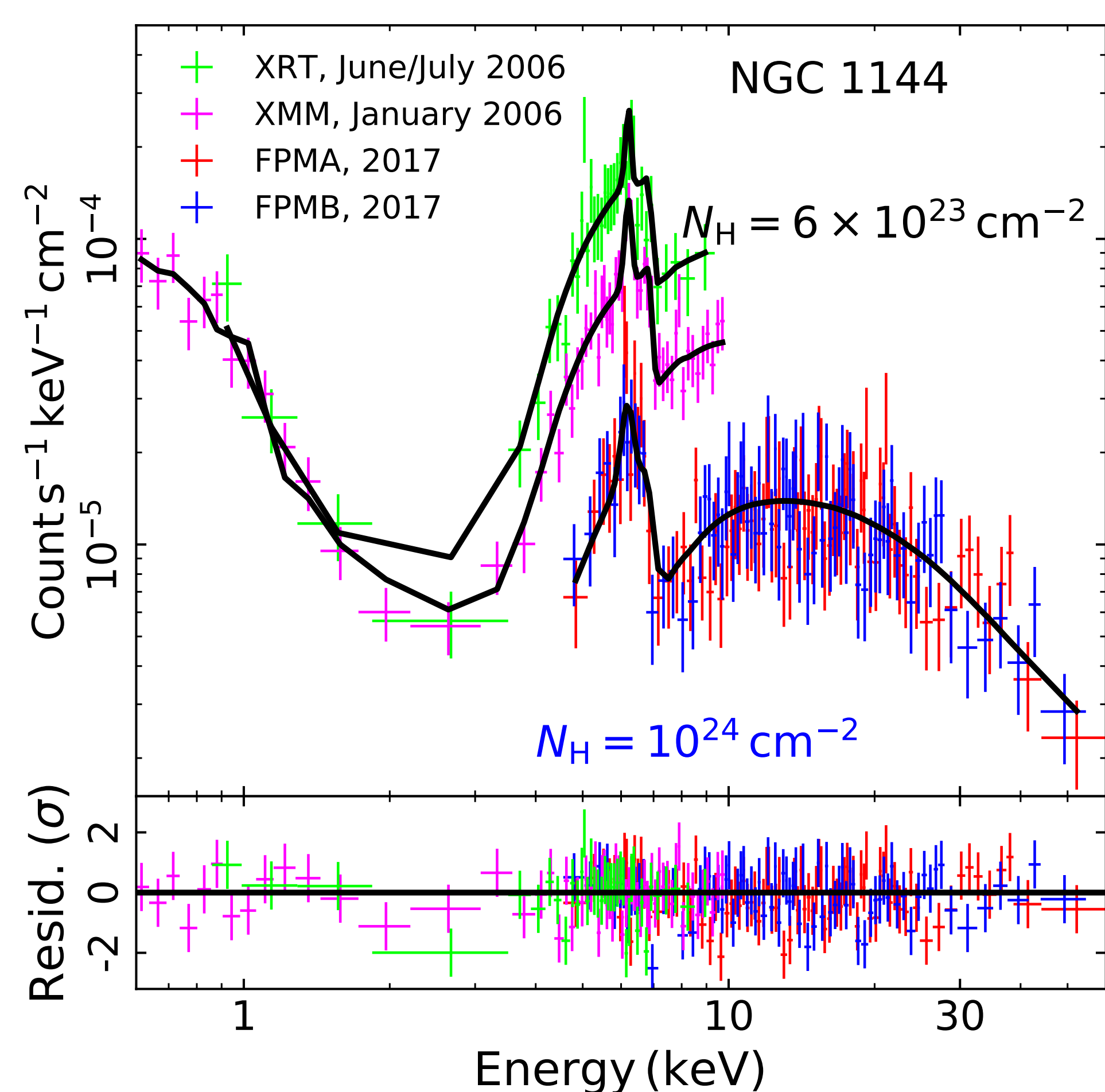


An example of a source with $10^{23} \text{ cm}^{-2} < N_H < 10^{24} \text{ cm}^{-2}$



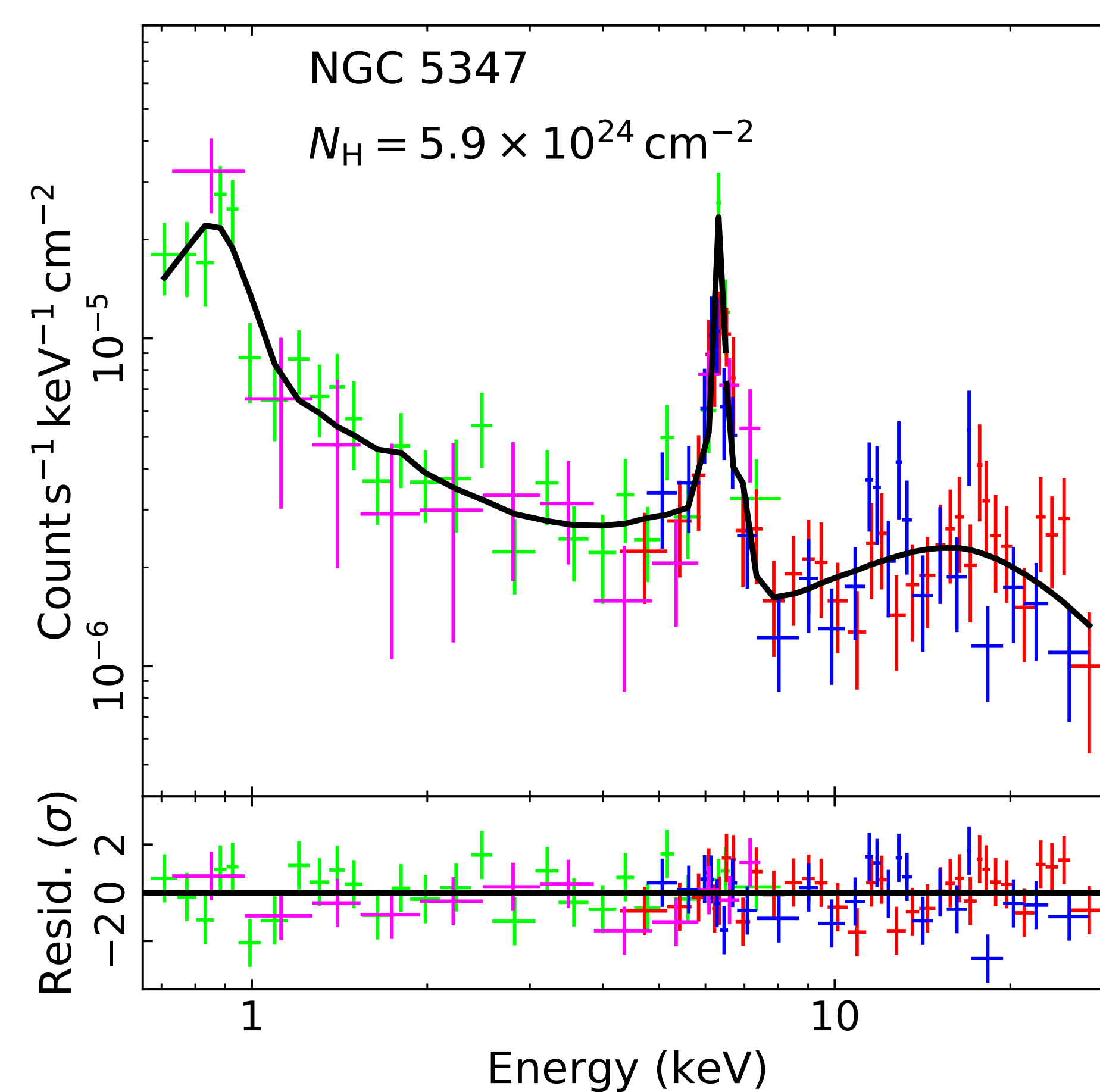
Histogram of the measured line-of-sight N_H obtained by analyzing 21/22 sources.

Variability

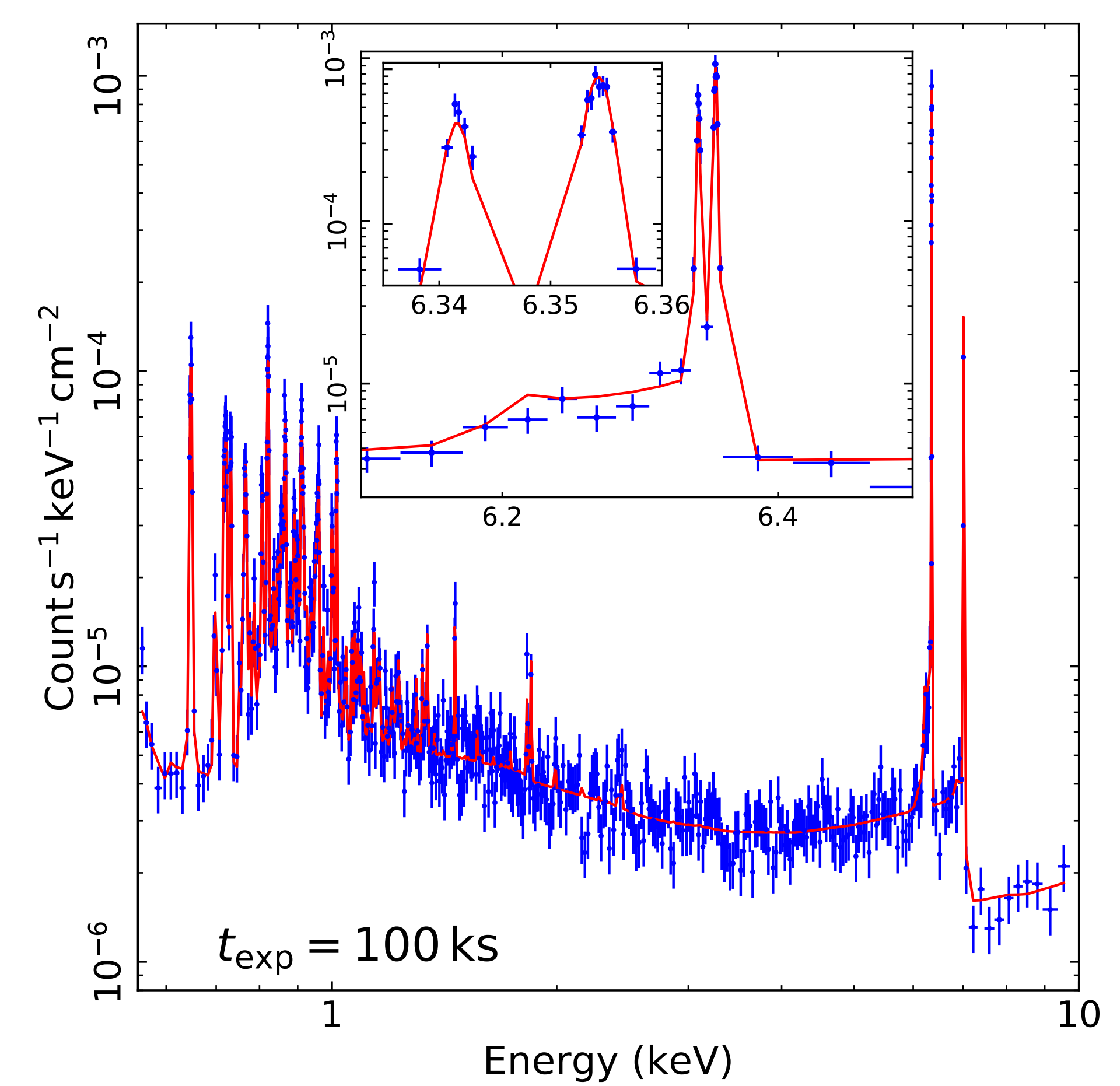


6/21 analyzed sources show **intrinsic and/or absorption variability** on long timescales.

The case of NGC 5347



Chandra (2004), Suzaku (2008) and NuSTAR/FPMA-FPMB (2015) spectra of NGC 5347 ($d = 35.5$ Mpc) revealing a bona fide Compton thick AGN.



Athena/X-IFU simulated spectra of NGC 5347). The Fe K α 1,2 lines and the Compton shoulder will be clearly resolved and separated.

To do

- Is the distribution of the line-of-sight N_H the same as the equatorial (global) one assuming a toroidal reprocessing material?
→ “Reflection models” versus physical models (e.g, MYTorus, Borus).
- Can we infer the location of the reprocessing material?
→ Width of the narrow Fe K α lines due to Doppler and gravitational shifts.