



Study of cyclical behaviour in spectral state transitions of NS-LMXB systems

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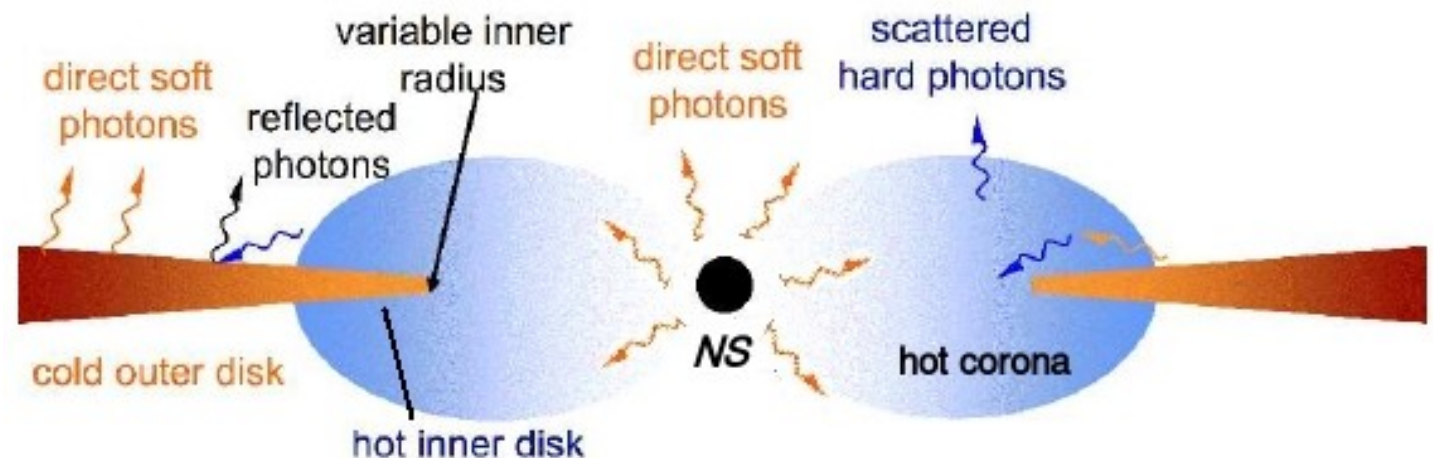
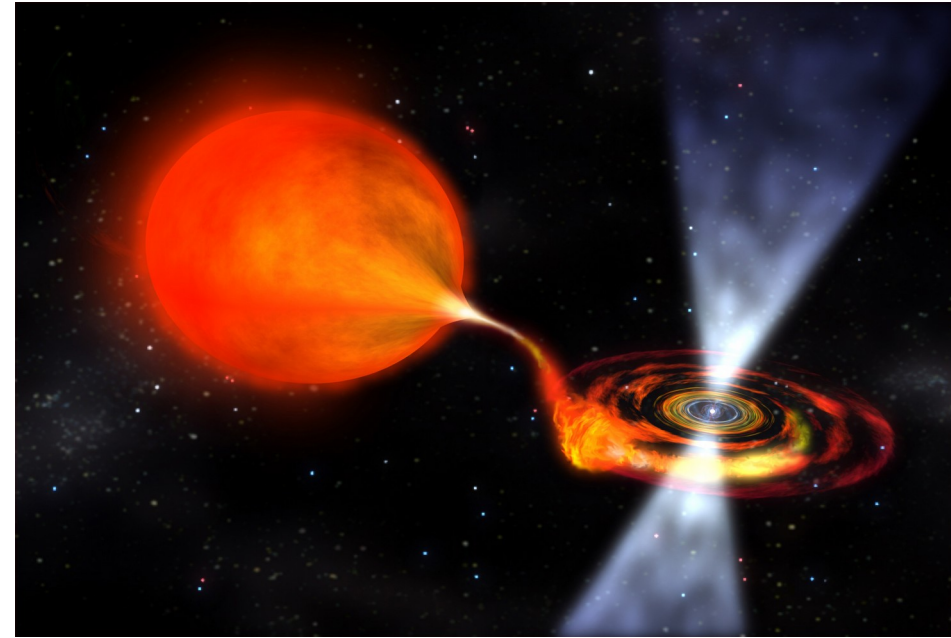
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NS-LMXBs spectral emission

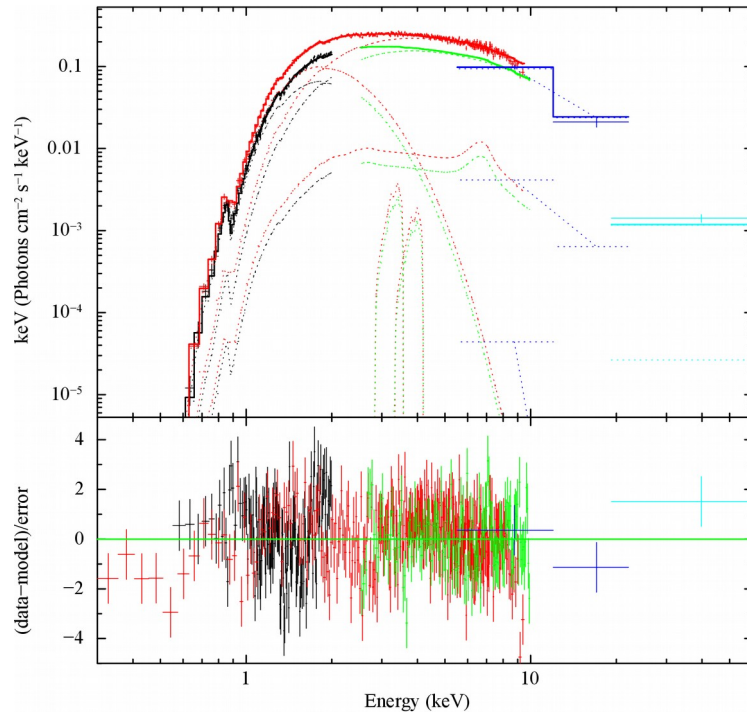
- Blackbody and/or Multicolour Blackbody
- Comptonisation
- Reflection
- Fluorescence emission lines and absorption lines/edges



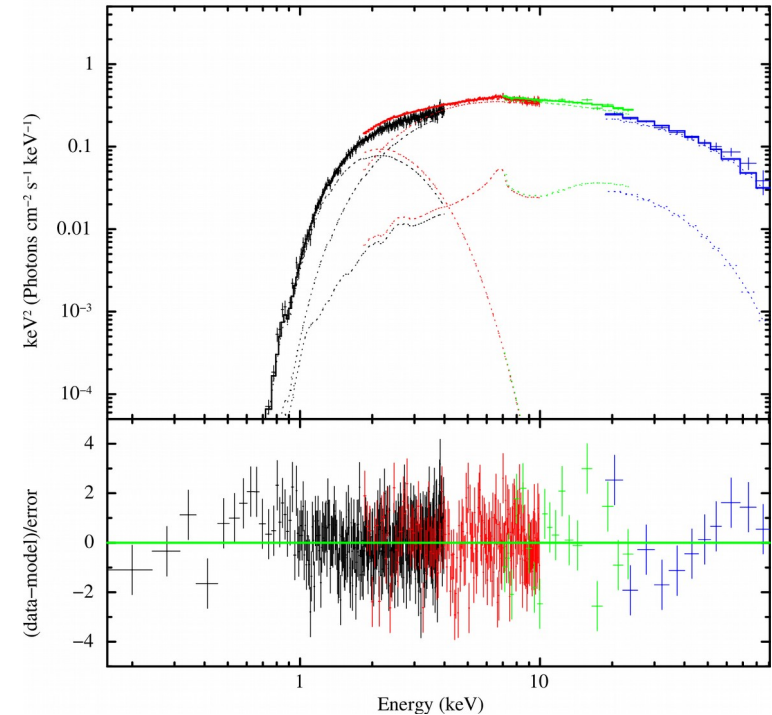
Spectral States

4U 1702-429

Soft/High State (SS)
XMM-Newton/INTEGRAL
observation (2010)



Hard/Low State (HS)
BeppoSAX observation (2000)

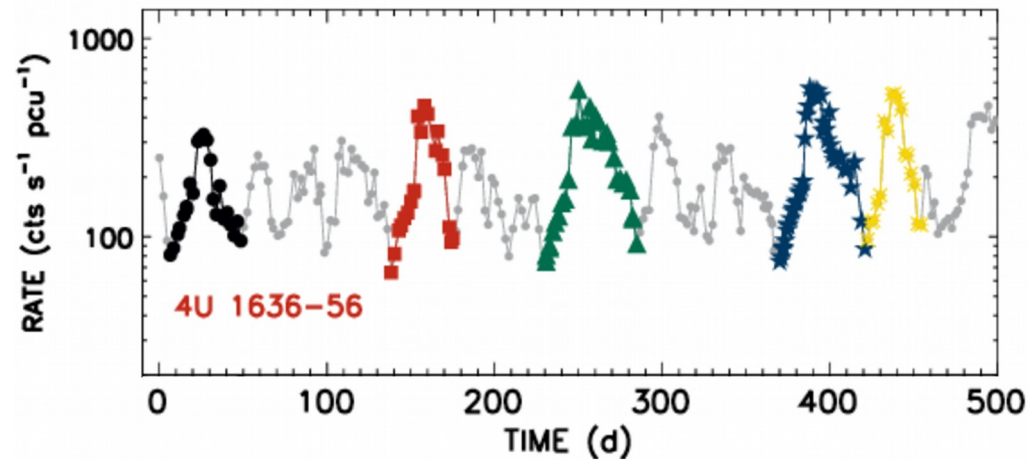


[S. M. Mazzola et al., 2019, A&A, 621, A89]

- Thermal dominated
- High luminosity
- Emission lines from highly ionised matter

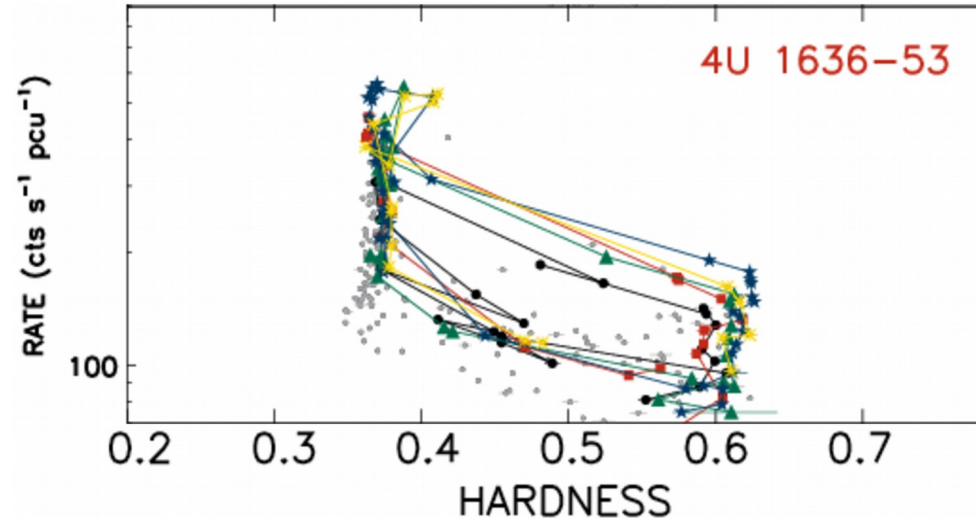
- Compton dominated
- Low luminosity
- Emission lines from slightly ionised matter

Cyclical behaviour in spectral state transitions



★ Hysteresis-like behaviour

★ Similar pattern for all the state transitions



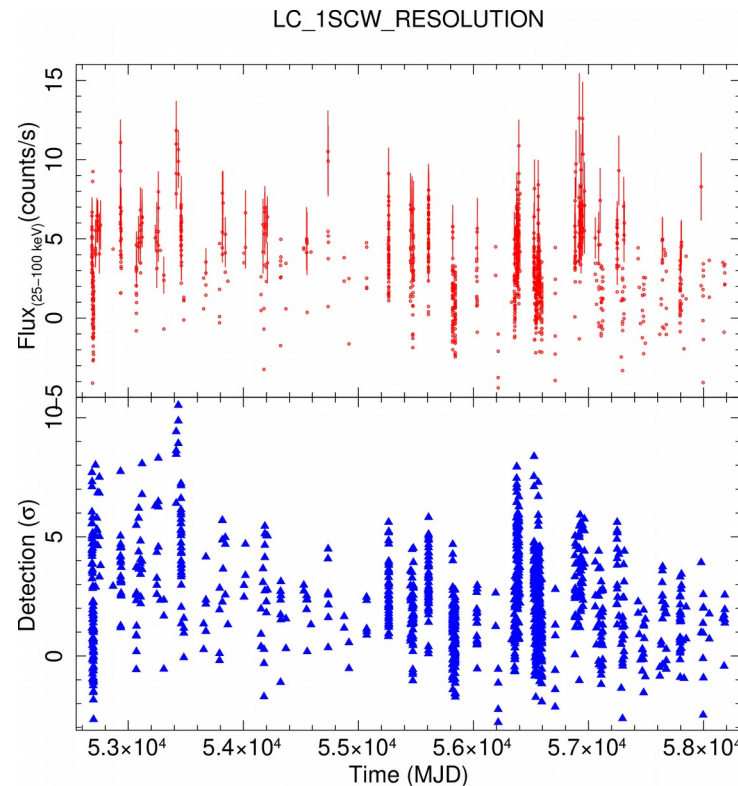
★ Cyclical pattern both in HID and RID

[Muñoz-Darias et al. 2014, MNRAS, 432, 2, 1330]



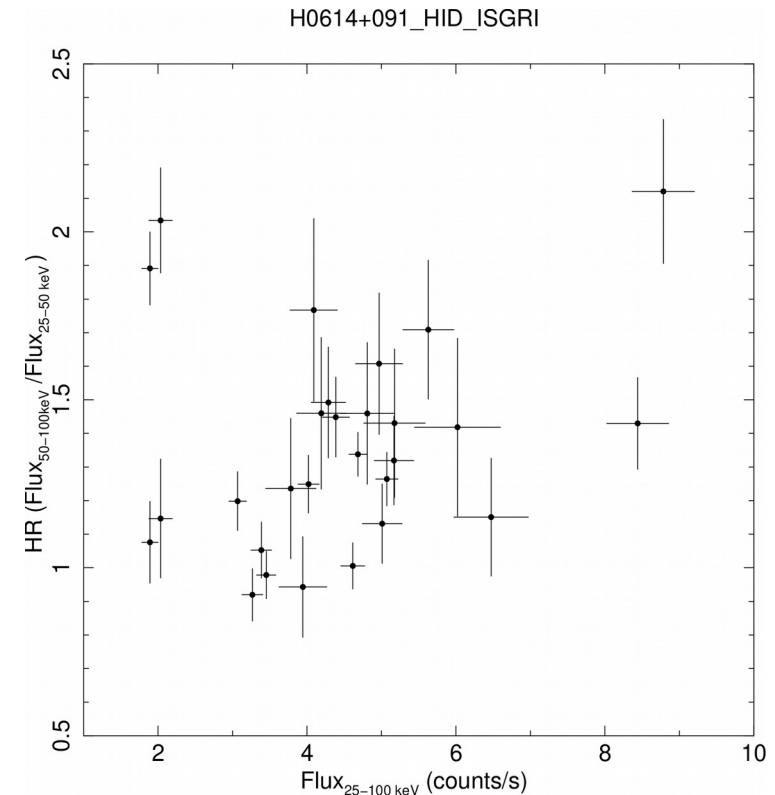
Long term analysis on INTEGRAL data : the Hardness-Intensity Diagram (HID)

The test source H0614+091



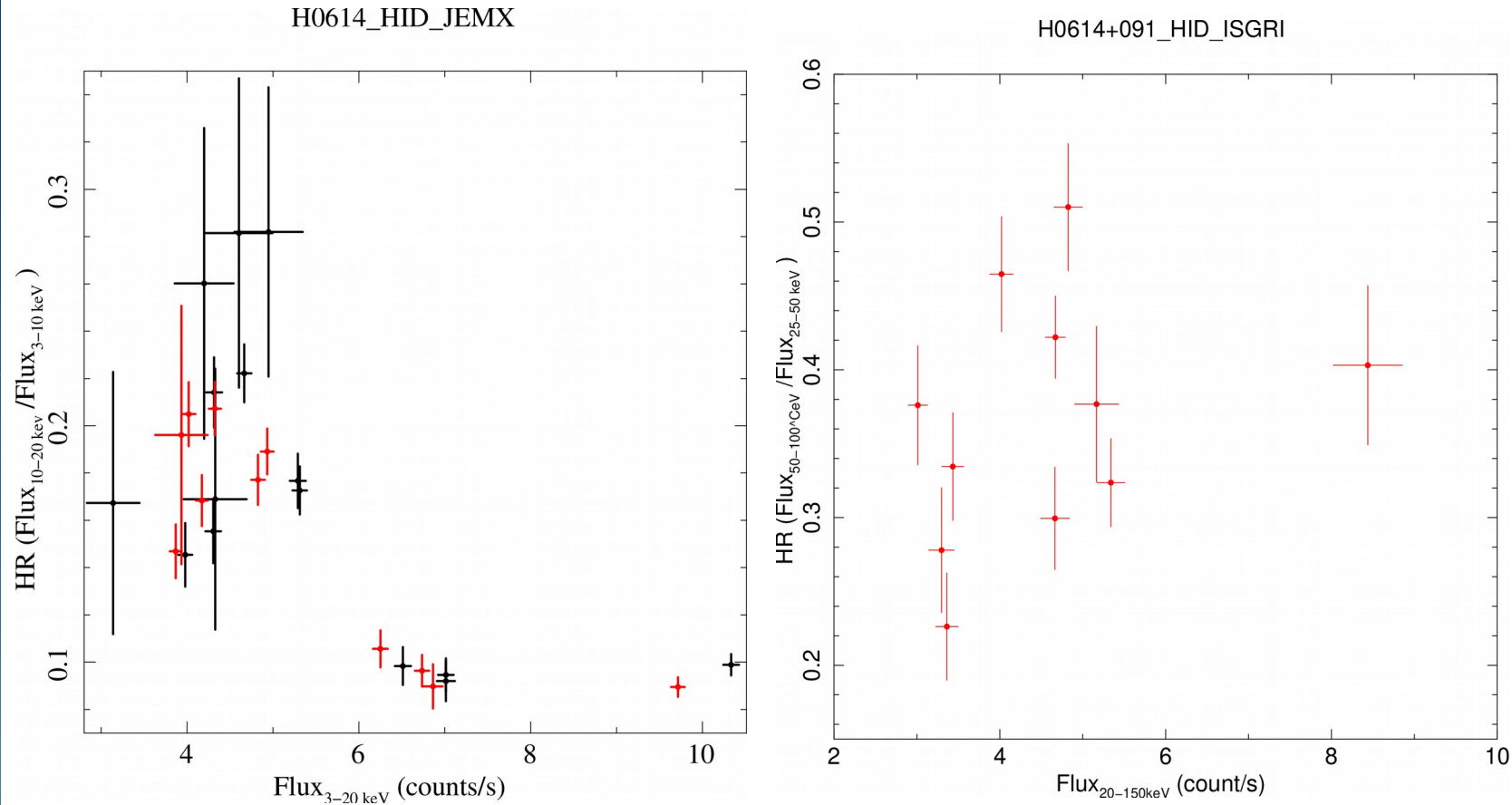
Variation over the time of the
detection (bottom) and the
count rate (top) in the 25-100
keV energy band

➡ 1 point = 1 scw



ONLY scw with S/N > 3 in each
energy band

Long term analysis on INTEGRAL data : Group spectra extraction



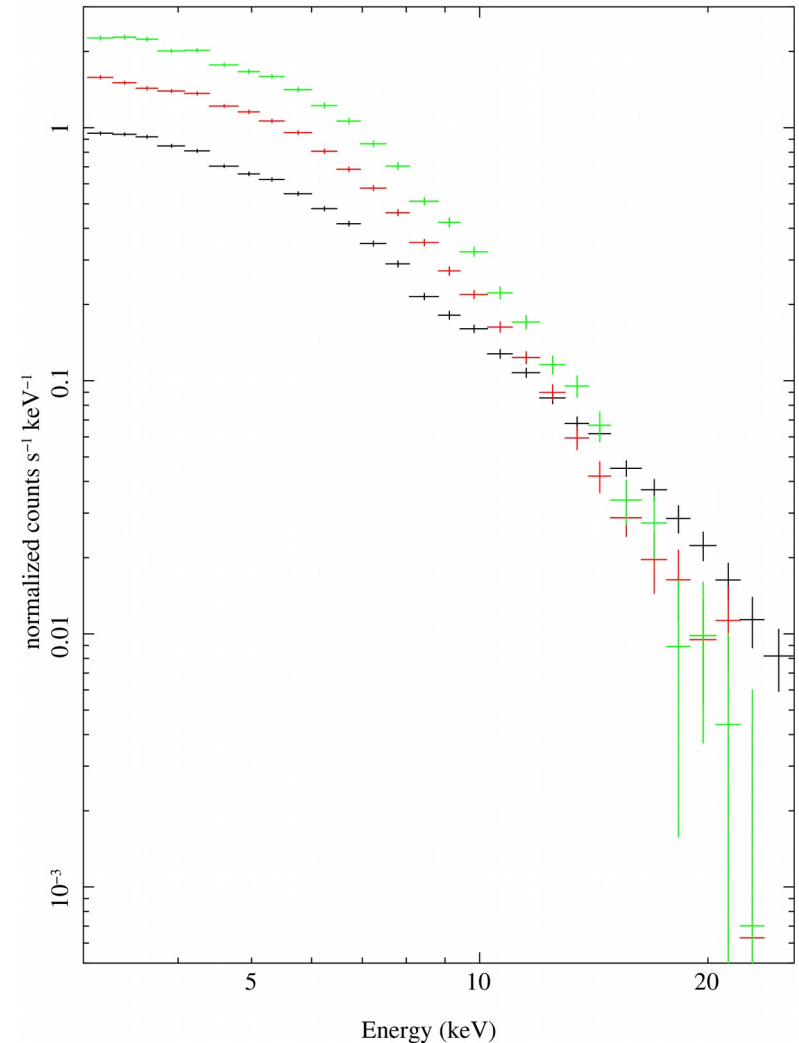
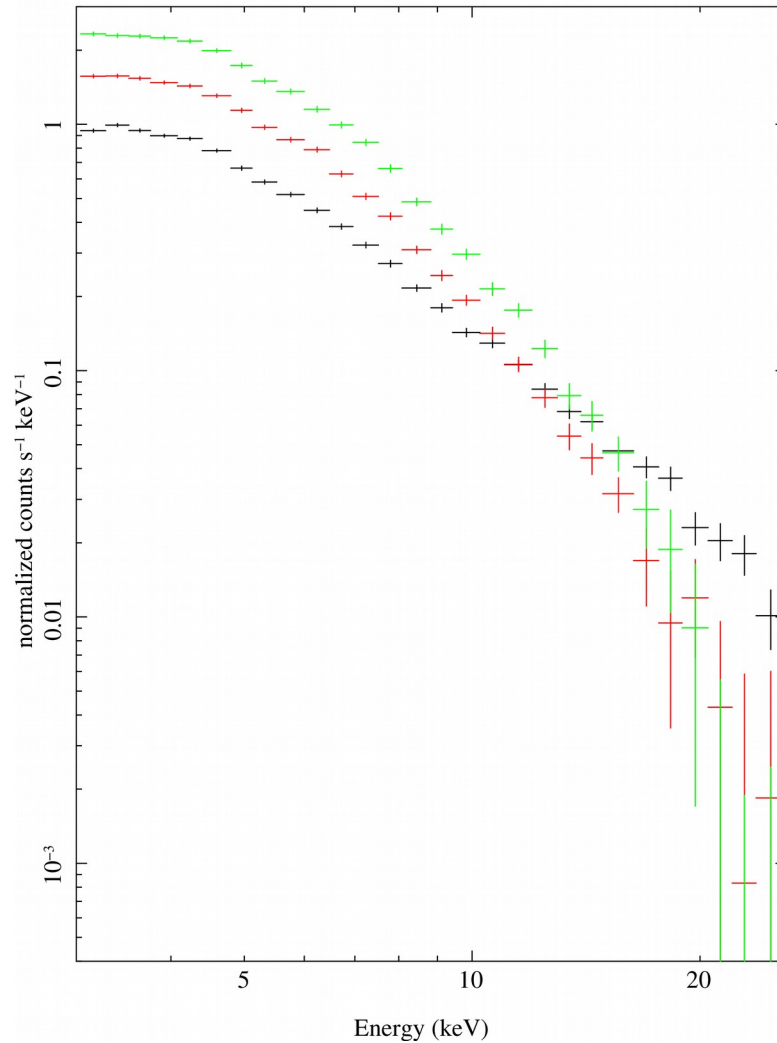
- Reducing the “unity” of analysis to 1 rev
- Grouping of observation with similar HID position



Long term analysis on INTEGRAL data : Group spectra extraction

H0614+091_spectra_JEMX1

H0614+091_spectra_JEMX2

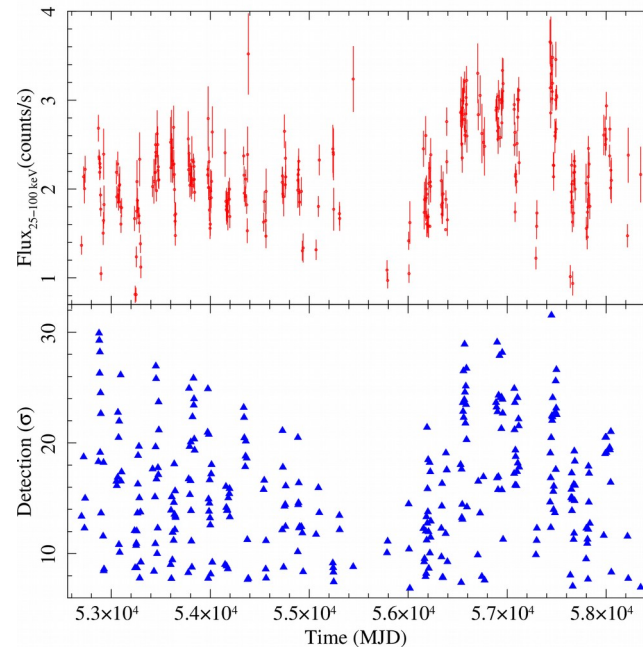


- Combinig the spectra of the observations to obtain a single spectrum for each group

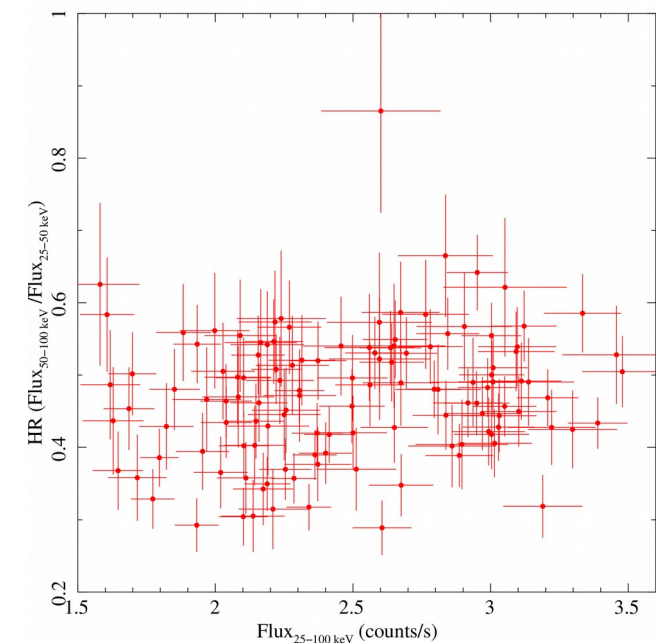


Application : the source SLX 1735-269

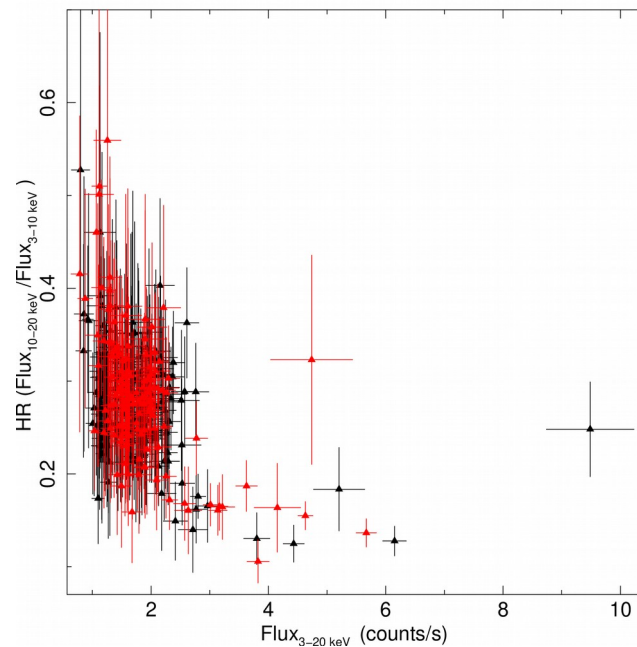
LC_1REV_RESOLUTION



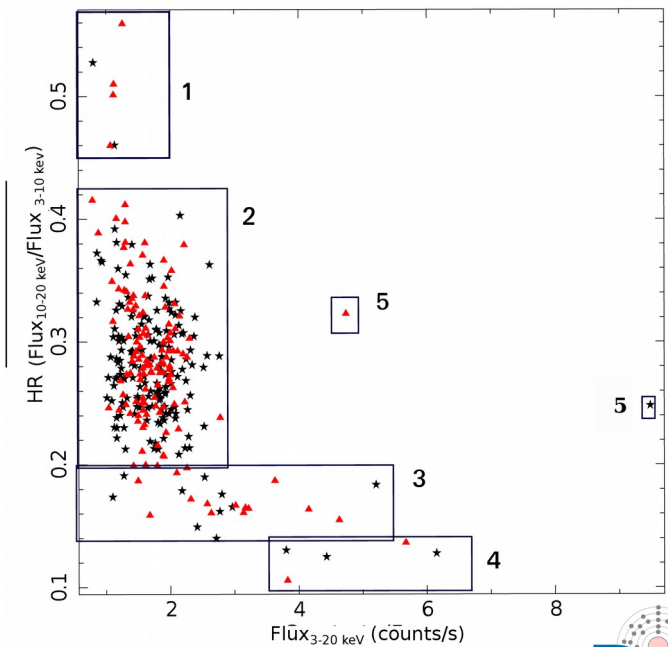
SLX 1735-269_HID_ISGRI



SLX 1735-269_HID_JEMX

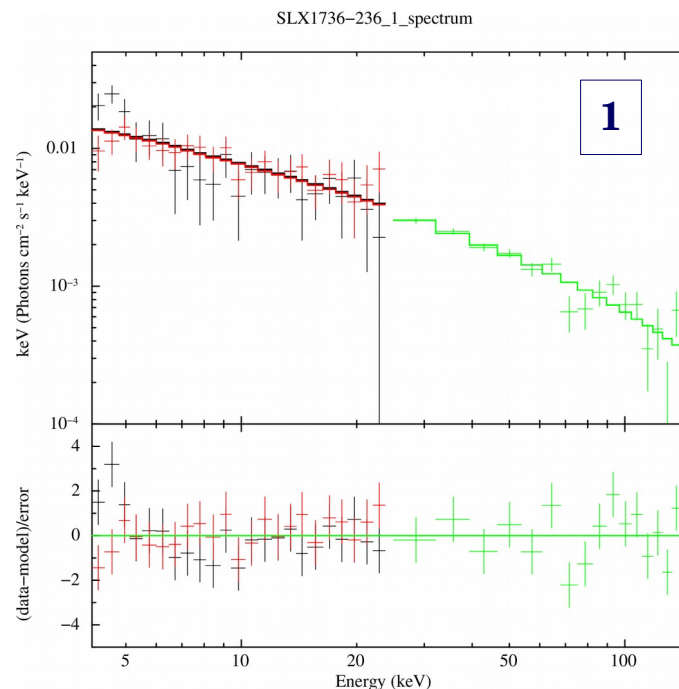


SLX 1735-269_HID_JEMX

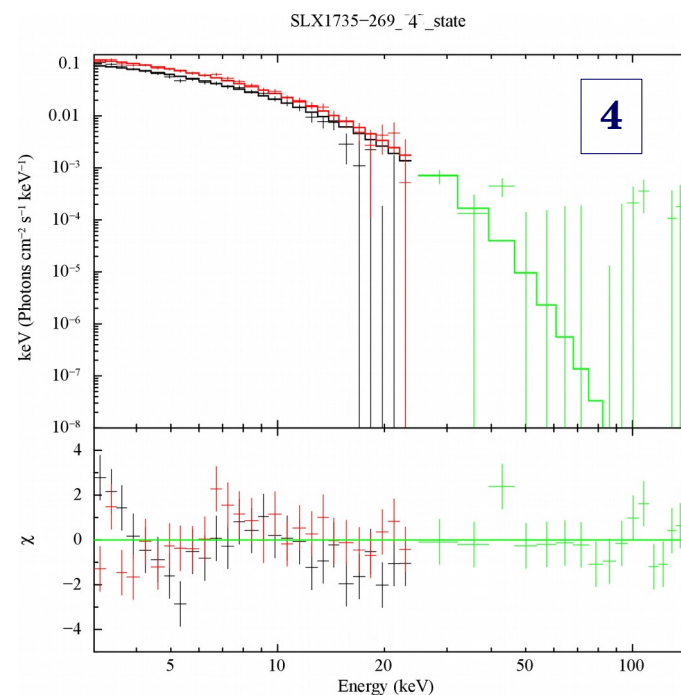
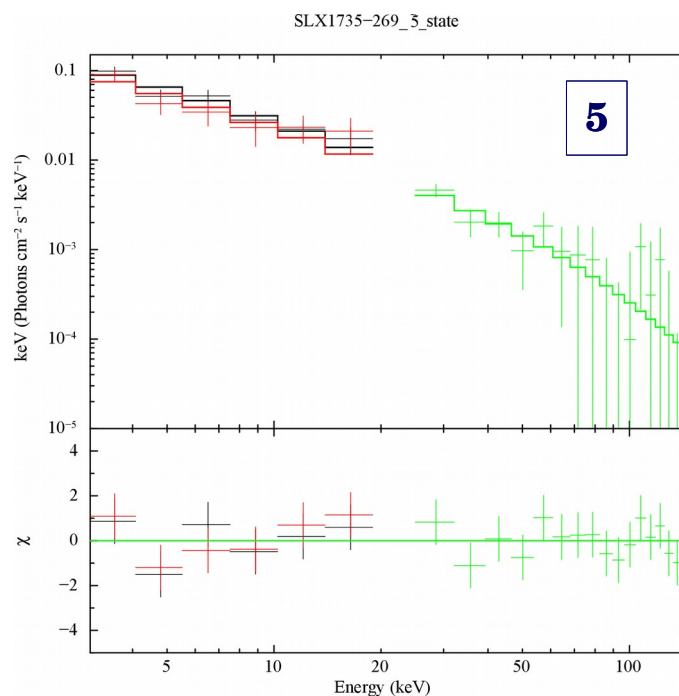




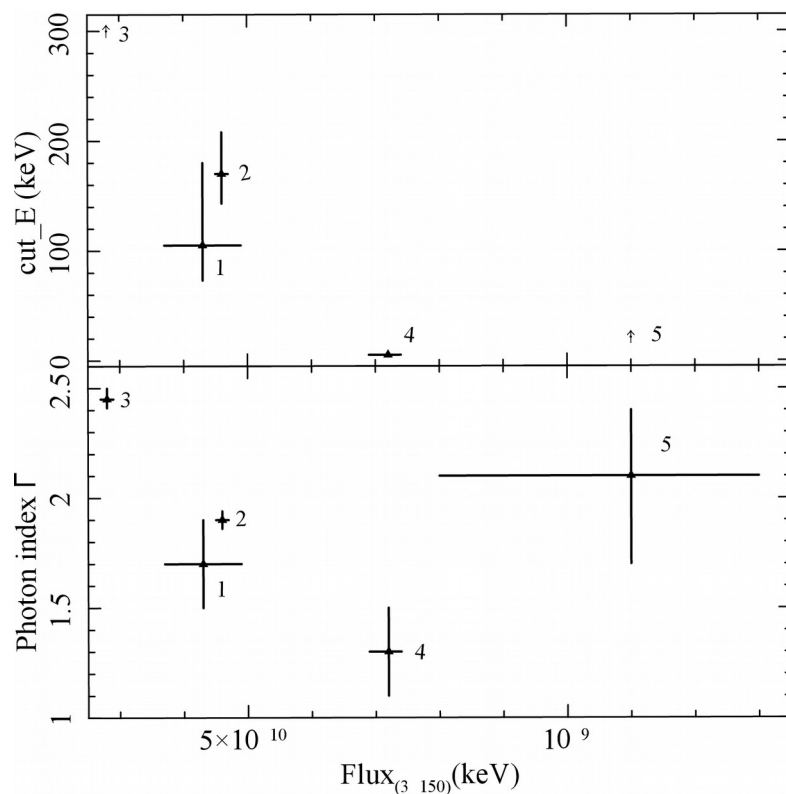
Preliminary results



➤ Broadband spectral analysis of the group spectra with a simple model of a cut-off powerlaw and an absorption component

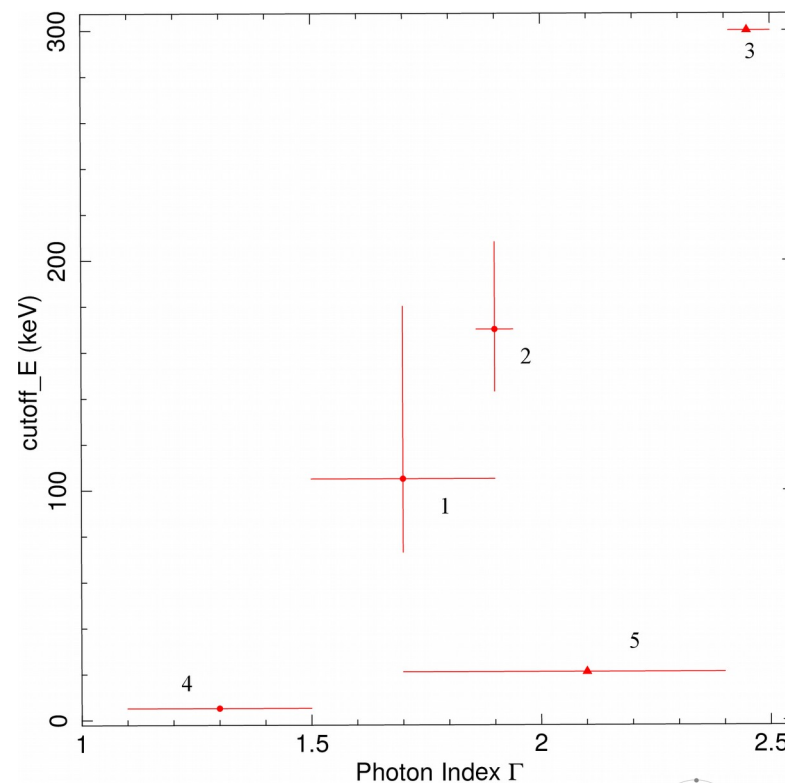


Preliminary results



► Energy cut-off and photon index vs flux

► Energy cut-off vs Γ





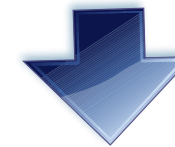
Future aim



Developing and putting in place the analysis method



Application of the method on all the persistent NS-LMXB detected by INTEGRAL (> 30 sources)



Systematic analysis on all the available INTEGRAL data (from 2002 to 2018)

Thank you for your attention !

