On the behavior of the black hole candidate 1E 1740.7–2942's corona based on long-term INTEGRAL data base

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One of the most straightforward ways to explain the hard X-ray spectra of X-ray binaries is to assume that comptonization of soft photons from the accretion disk is occurring. The region in which this comptonization takes place, called the corona, is commonly characterized by only two parameters: its thermal energy kT and its optical depth τ. Thus, hard X-ray spectra analysis is an important tool in diagnosing the behavior of these parameters.

With the aim of better understanding such behavior for the black hole candidate 1E 1740.7–2942, we performed an homogeneous analysis for a large data set from the ISGRI telescope onboard the INTEGRAL satellite.

IWARA 2020
6–12 September

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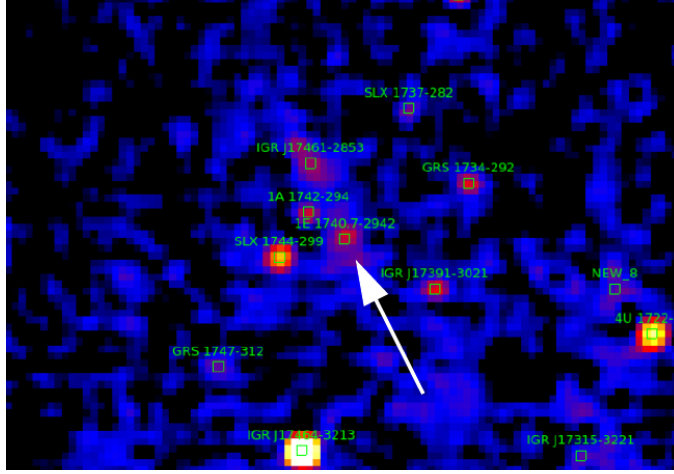
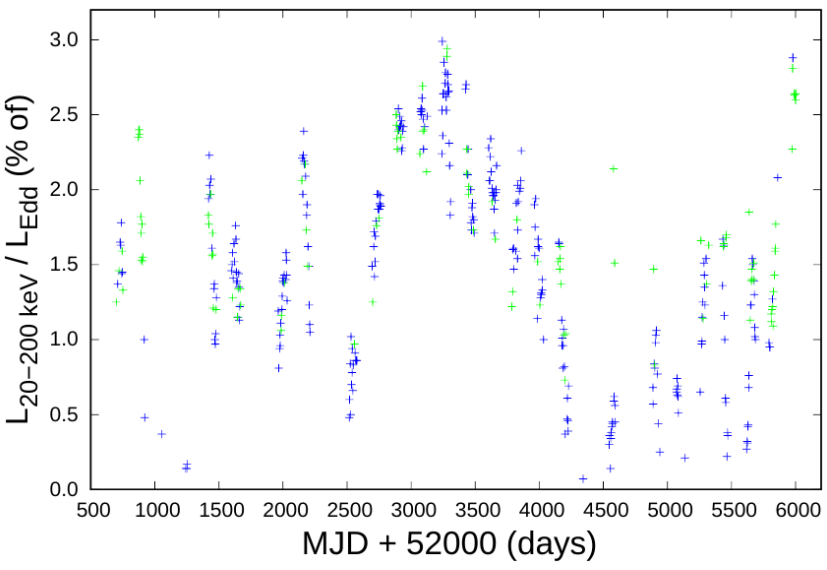
479 revolutions with 1E 1740.7−2942 in the FOV were retrieved (2003–2017)



SNR > 5: **392** spectra (20–200 keV)

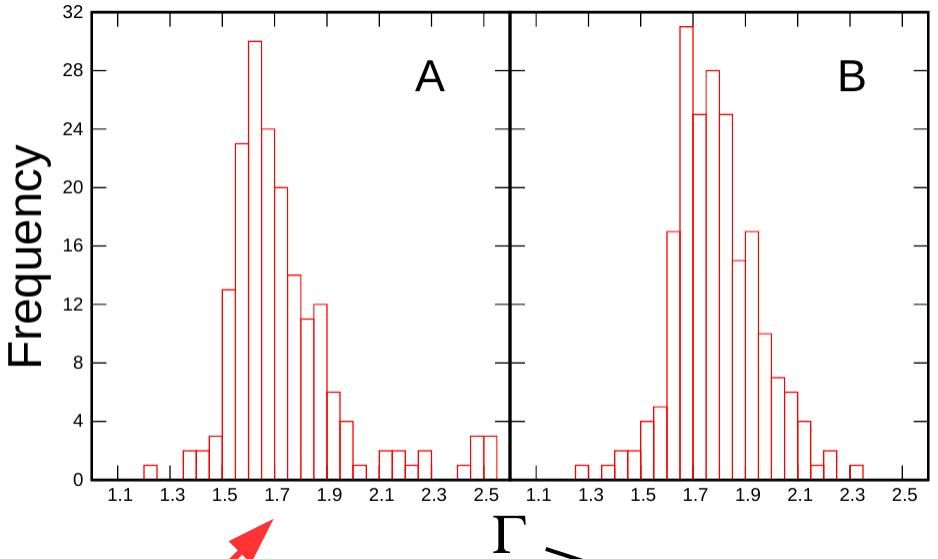


comptonization model **comptt** → f(kT, τ)
phenomenological **powerlaw** → f(Γ)

~**250** spectra fitted by both ($\chi^2_{red} < 2$) concurrently

$$y = 4\left(\frac{kT}{m_e c^2}\right)\left[1 + 4\left(\frac{kT}{m_e c^2}\right)\right]\tau(1+\tau)$$

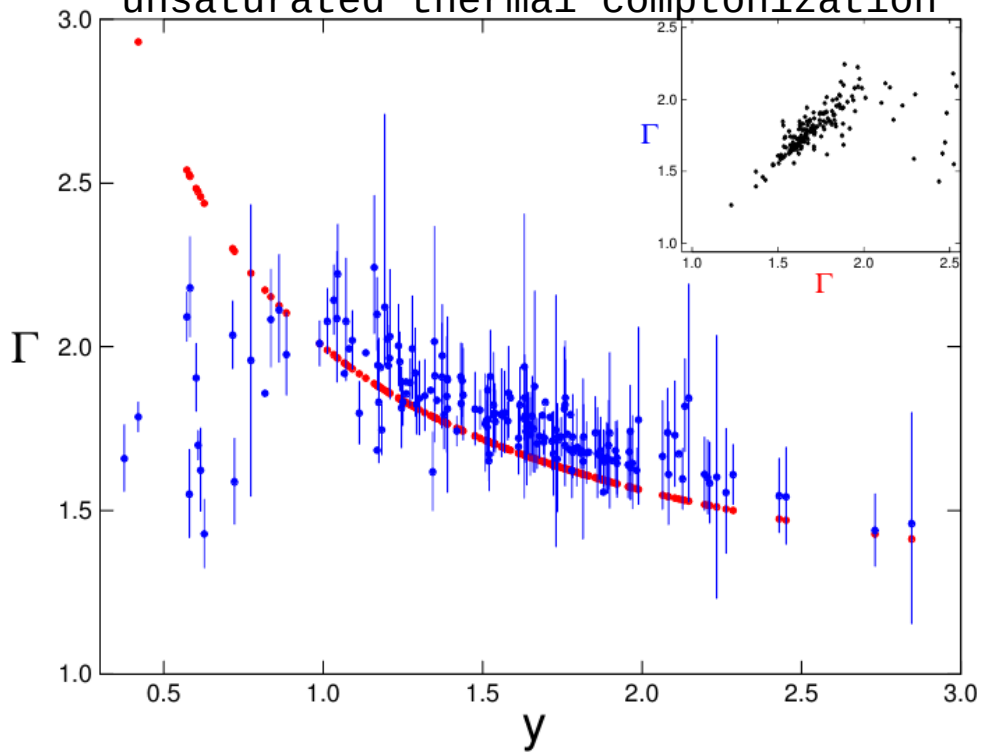
$$\Gamma = -\frac{1}{2} + \sqrt{\frac{9}{4} + \frac{4}{y}}$$



from **powerlaw** fit

from y parameter
(i.e. **comptt** fit [kT, τ])

y = 1.53 ± 0.65
unsaturated thermal comptonization



A simple thermal comptonization model reproduces the spectra of 1E1740.7–2942 very well, i.e. the shape (as in the power-law index) variability observed may be completely explained by means of the variation of the corona parameters kT and τ for most of our sample. A closer look at the not-fitted spectra is required for further conclusions.