

NuSTAR observations of 1ES 0229+200

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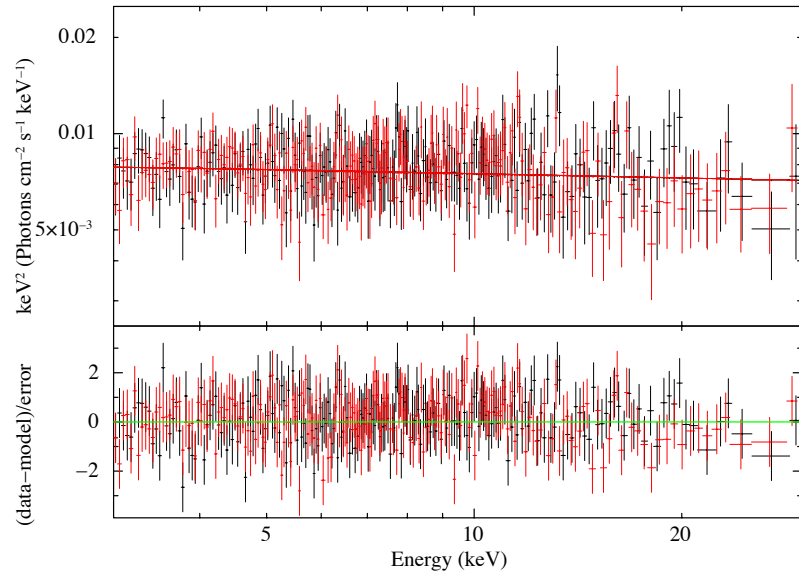
IACHEC CoObs WG, Oct 22 2021

1ES 0229+200

- 3 observations (60002047002,4,6) taken 2013-10-02 (16.3ks), 2013-10-05 (20.3ks), 2013-10-10 (18.0ks)
- 3 further observations (10702609002,4,6) taken 2021-08-08 (95.2ks), 2021-08-11 (58.1ks), 2021-08-13 (56.1ks)
- Data extracted from 60-arcsec radius circular region, 90-arcsec radius background, using latest CALDB
- Binned up in 20 counts per bin, fitting with χ^2 statistics
- Using absorbed power-law and log-parabola models (tbabs*powerlaw & tbabs*logpar, $E_{\text{pivot}} = 3.5$ keV) with N_{H} frozen to Galactic: $N_{\text{H}} = 8.06 \times 10^{20} \text{ cm}^{-2}$

2013 observations

60002047002 (powerlaw)



powerlaw:

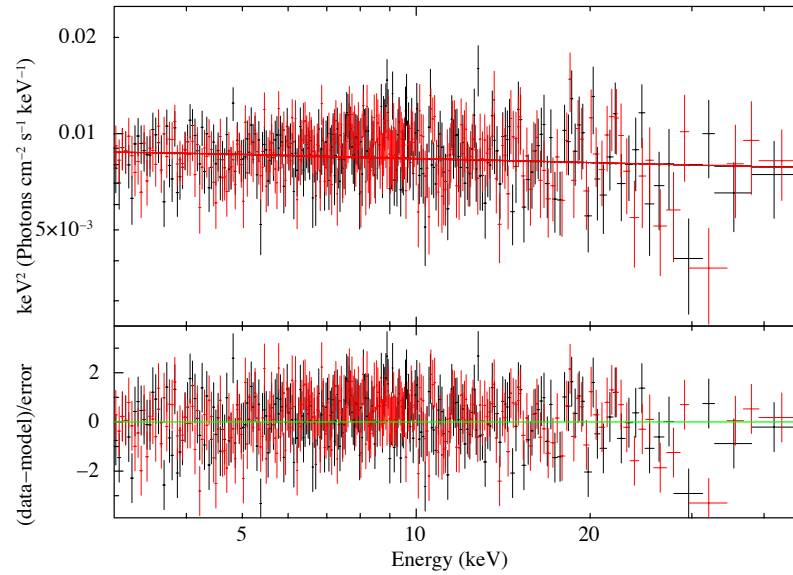
- $\Gamma = 2.04 \pm 0.03$, norm = $8.3 \pm 0.5 \text{ e-}3$

logpar:

- $\alpha = 1.9 \pm 0.1$, $\beta = 0.22 \pm 0.14$,
norm = $6.2 \pm 0.2 \text{ e-}4$

Flux = $2.7 \times 10^{-11} \text{ erg/cm}^2/\text{s}$

60002047004 (powerlaw)



powerlaw:

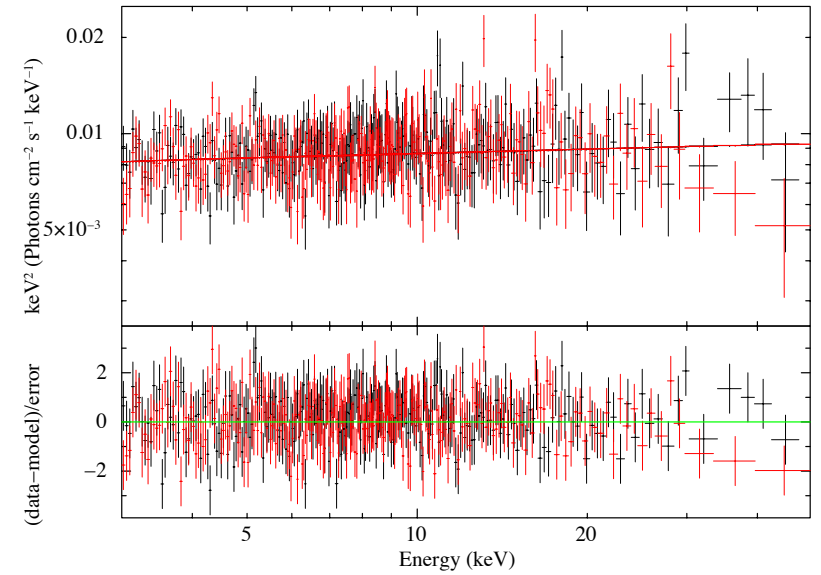
- $\Gamma = 2.04 \pm 0.02$, norm = $9.3 \pm 0.5 \text{ e-}3$

logpar:

- $\alpha = 1.85 \pm 0.08$, $\beta = 0.26 \pm 0.10$,
norm = $6.8 \pm 0.2 \text{ e-}4$

Flux = $3.6 \times 10^{-11} \text{ erg/cm}^2/\text{s}$

60002047006 (powerlaw)



powerlaw:

- $\Gamma = 1.96 \pm 0.03$, norm = $7.8 \pm 0.4 \text{ e-}3$

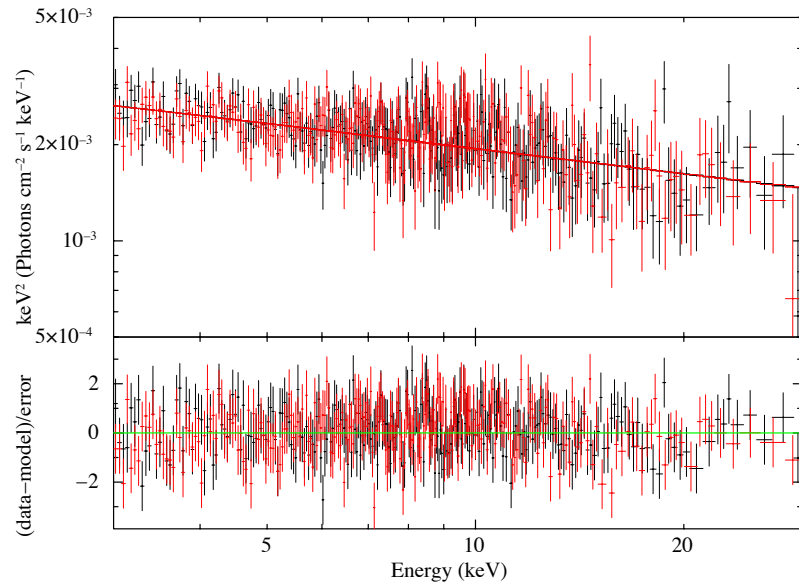
logpar:

- $\alpha = 1.88 \pm 0.08$, $\beta = 0.10 \pm 0.09$,
norm = $6.6 \pm 0.2 \text{ e-}4$

Flux = $3.8 \times 10^{-11} \text{ erg/cm}^2/\text{s}$

2021 observations

10702609002 (powerlaw)



powerlaw:

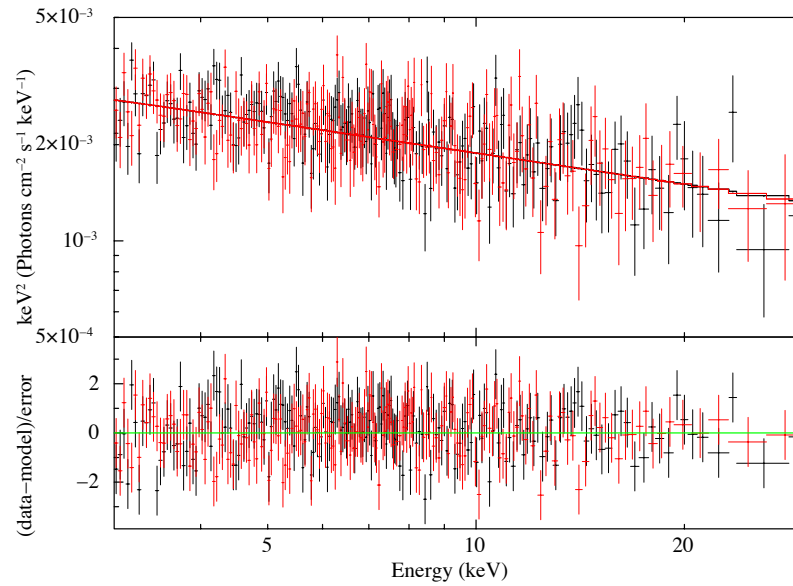
- $\Gamma = 2.25 \pm 0.03$, norm = $3.6 \pm 0.2 \text{ e-3}$

logpar:

- $\alpha = 2.12 \pm 0.08$, $\beta = 0.23 \pm 0.11$,
norm = $2.04 \pm 0.06 \text{ e-4}$

Flux = $7.2 \times 10^{-12} \text{ erg/cm}^2/\text{s}$

10702609004 (powerlaw)



powerlaw:

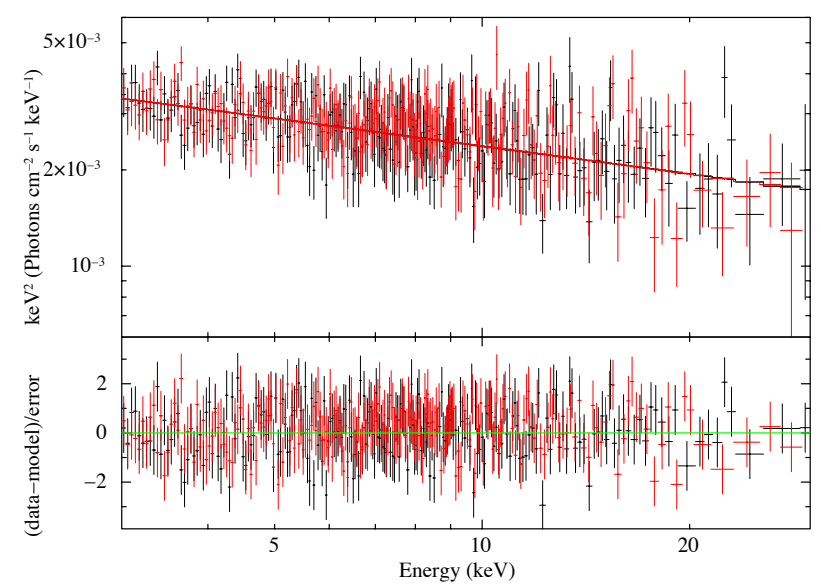
- $\Gamma = 2.32 \pm 0.03$, norm = $4.0 \pm 0.3 \text{ e-3}$

logpar:

- $\alpha = 2.21 \pm 0.10$, $\beta = 0.19 \pm 0.15$,
norm = $2.14 \pm 0.08 \text{ e-4}$

Flux = $7.1 \times 10^{-12} \text{ erg/cm}^2/\text{s}$

10702609006 (powerlaw)



powerlaw:

- $\Gamma = 2.29 \pm 0.03$, norm = $4.6 \pm 0.3 \text{ e-3}$

logpar:

- $\alpha = 2.20 \pm 0.09$, $\beta = 0.14 \pm 0.13$,
norm = $2.55 \pm 0.08 \text{ e-4}$

Flux = $8.9 \times 10^{-12} \text{ erg/cm}^2/\text{s}$

Notes

- Results do not change significantly when N_{H} is set to a higher value
- During 2021 observations, the source is softer and about a quarter of the flux of the 2013 observations (only detected out to ~ 30 keV)
 - This is still perfectly sufficient for cross-calibration with lower-energy instruments