



Multifrequency Observations of the Gamma-Ray Blazar 3C 279 in Low State



We detected the blazar 3C 279 with INTEGRAL/IBIS at hard X-ray energies (20 to 80 keV) at a time when it showed the lowest optical flux during the last 10 years. This observation provides new constraints for the modeling of 3C 279.

The prominent Gamma-Ray blazar 3C 279 was observed by INTEGRAL for 300 ksec between June 1 and 5, 2003. The INTEGRAL observation was organized as a multifrequency campaign and therefore was supplemented by simultaneous observations in radio and mm bands, in near-IR and optical bands, and in X-rays by a 5 ksec Chandra observation.

The measured optical flux shows that 3C 279 was measured in the lowest activity state of the last decade (Fig. 1). IBIS/ISGRI detected the blazar at hard X-rays at the 6σ level (Fig. 2). The derived multifrequency spectrum shows the typical two-hump shape, i.e. synchrotron emission at low – and inverse-Compton emission at high energies. The comparison to a high-state spectrum (Fig. 3) reveals a new result: despite the large differences in the optical flux, the hard X-ray flux is close to the high-state measurement. This provides new constraints for the modeling of 3C 279.

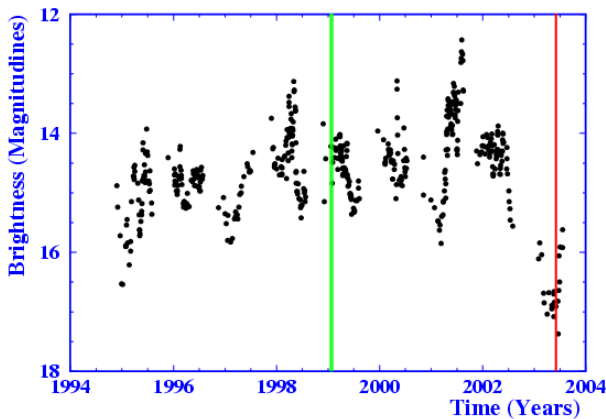


Fig. 1: Longterm R-band light curve of 3C 279 during the last decade. The red line is the observation time of INTEGRAL in 2003, and the green line corresponds to a Gamma-ray high state observation in 1999.

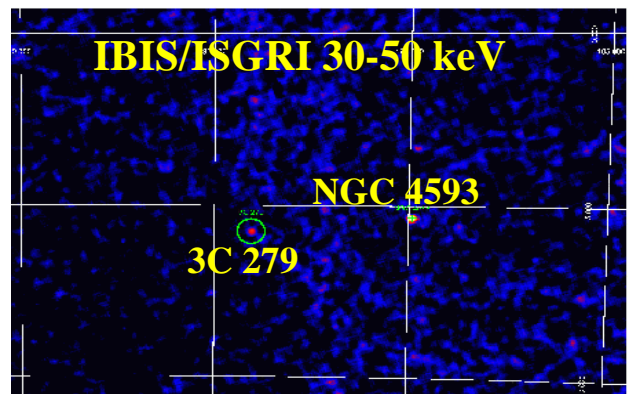
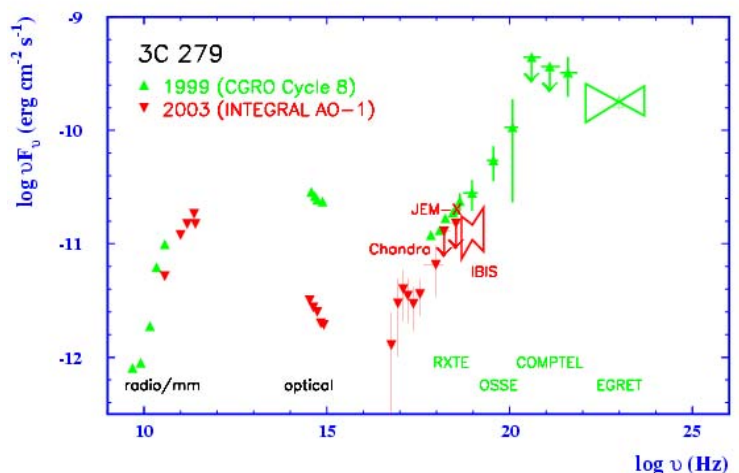


Fig. 2: The IBIS/ISGRI experiment detected 3C 279 between 20 and 80 keV with a significance of 6.6σ , and the Seyfert galaxy NGC 4593 at 11.6σ . The spectrum shows a power-law shape ($\alpha: 1.9 \pm 0.4$).

Fig. 3: The multifrequency spectrum of 3C 279 in 2003 during optical low-state (red) is compared to a high-state measurement in 1999 (green). The new observational fact is, that despite the large difference in optical flux, the hard X-ray flux is close to the high-state measurement. The optical synchrotron flux is suppressed, but the SSC flux at hard X-rays is weakly affected. This provides a new constraint for the modeling of 3C 279.



References:

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- W. Collmar, M. Böttcher, V. Burwitz, et al., 2004, ESA SP-552, in press

W. Collmar, V. Burwitz, S. Komossa, P. Kretschmar, K. Pottschmidt, et al.