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Two years of INTEGRAL observation of the BHC IGR J17464-3213

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Abstract

On March 2003, IBIS, the γ-ray imager on board the INTEGRAL satellite, detected an outburst from a new source, IGR J17464-3213, that turned out to be an HEAO-1 transient, namely H1743-322. The spectral and temporal evolutions of the source were observed by INTEGRAL in different periods. Also RXTE observed the source for the first time on 2003 March 29 during a PCA Galactic bulge scan. The source flux decayed below the RXTE PCA sensitivity limit in November 2003, then in April 2004 it was again detected by INTEGRAL. On July 3, 2004 the source was again detected by RXTE/PCA at a 2–10 keV intensity of 16 mCrab and on July 7, reached 69 mCrab. Recently, a new outburst was observed on August 2005. We briefly summarise here the behaviour of the source observed by INTEGRAL from March 2003 to August 2005. The new outbursts of the source and the analysis of all the data collected (now public) give a global view of the spectral and time behaviour of this X-ray transient.

Keywords: γ-Rays, observations; BHC, bulge; INTEGRAL; IBIS

1. Introduction

IGR J17464-3213 was localized by INTEGRAL at (90% confidence) R.A. (2000) = +17h 46.3m, Dec. = −32°14.4′, with 1.6 arcmin radius error box (Revnivtsev et al., 2003) and associated with H1743-322 (Markwardt et al., 2003), a bright black hole candidate (BHC) observed by HEAO1 in 1977 with an intensity of 700 mCrab at 2–10 keV (Doxsey et al., 1977). After the 2003 outburst began, the source remained bright in soft X-rays ($E < 15$ keV) for ∼8 months (Kretschmar et al., 2003) and was regularly detected with the JEM-X monitor. At high energy, the IBIS telescope detected the source only on September 9 (52891 MJD). The flux measured during this and subsequent days was strongly variable on a time scale of hours with the mean level of about 15 mCrab in both 15–40 and 40–100 keV bands and with peak values of 25–35 mCrab (Grebenev et al., 2003). We report here a preliminary analysis of all the data collected by INTEGRAL on this source from March 2003 to August 2005.

2. Data analysis and results

The analysed data set consists of all public data and Core Program (CP) observations in which IGR J17464-3213 was within the detectors field of view. All the CP observations are organised into un-interrupted ∼2000 s long science windows (SCWs): light curves, hardness ratio and spectra are then extracted for each SCW. Wide band spectra of the source are obtained using data from JEM-X and IBIS. The data summarised here were processed using the INTEGRAL Off-line Scientific Analysis (OSA) (Goldwurm et al., 2003).

2.1. Time evolution

Fig. 1 shows the total RXTE one-day averaged intensity light curve (1–12 keV) from March 2003 to August 2005.

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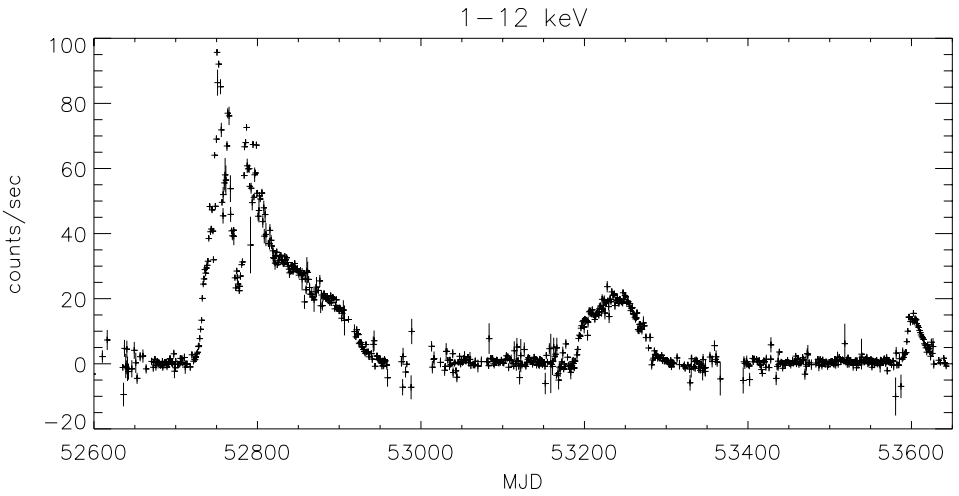

Fig. 1. RXTE–ASM one day averaged light curve of IGR J17464-3213, from March 2003 to August 2005.

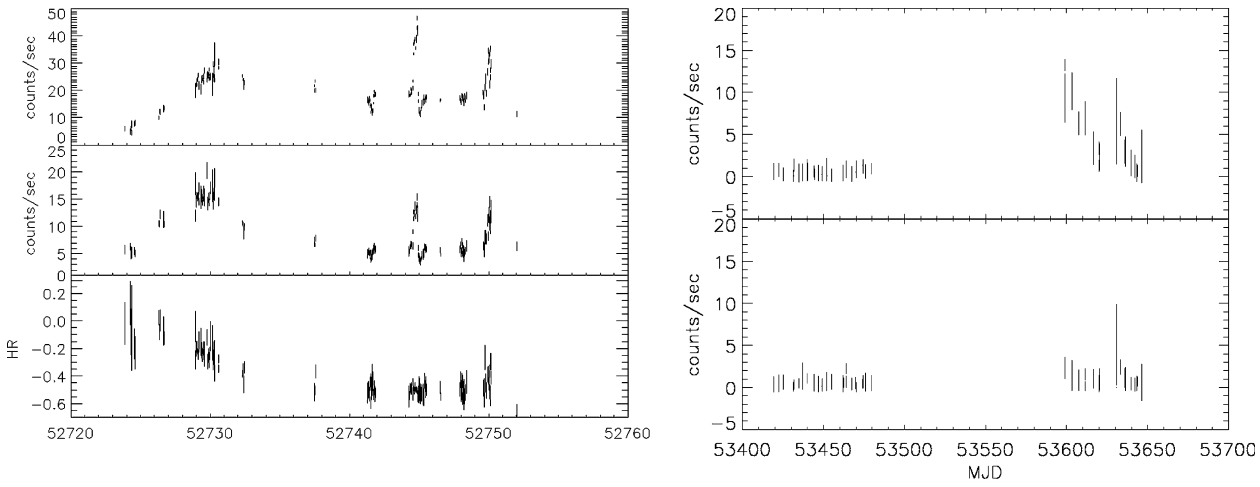

Fig. 2. Left: light curves (20–60 and 60–150 keV) and hardness-ratio of the first outburst (March–April 2003). Right: light curves (20–60 and 60–150 keV) of the August 2005 outburst.

Fig. 2 shows the time evolution of the source, collected from INTEGRAL data, in two energy range: 20–60 keV and 60–150 keV: the left panel shows the light curves of the first IGR J17464-3213 outburst (March–April 2003), while the right one shows the August 2005 outburst.

2.2. Spectral evolution of the first outburst

In Fig. 3, we show the spectral evolution of the source during the rise of the first outburst. The observations were performed in three different periods: from 2003 March 12 to 2003 April 15, from 2003 August 19 to 20 and from 2003 October 4 to 9. The first period contains four observations of the pre-outburst state of the source; the other two shorter observations cover the end of the outburst phase. Following the evolution of the spectrum from INTEGRAL revolution 53 to revolution 61, it is evident that the data show a quite hard Comptonised emission from 3 keV up to 150 keV during the rising part of the source outburst, with no detectable thermal emission (Fig. 3a). A few days later, a prominent soft disk multicolor component appears, with the hard tail luminosity almost unchanged: $\sim 5 \times 10^{-9}$ erg cm^{-2} s^{-1} (Fig. 3b). Fig. 4 shows the IBIS-JEMX spectrum of the main peak of the outburst. A prominent disk black body component is still present and is characterized by $T_{\rm in} = 1.70 \pm 0.03$ keV. The high energy part of the spectrum is best fitted with a simple power low with a photon index of 2.98 ± 0.01. After revolution 63, the INTEGRAL spectrum evolves again to the hard state, near the end of the outburst (rev. 120). The spectrum shows an hard Comptonised tail, but a soft disk black body component is still present Capitanio et al., 2005.

3. Conclusions

The picture obtained from the spectral analysis can be summarised as follows: