ENERGY SPECTRA OF X 1636–536 OBSERVED WITH ASCA

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1. Introduction

Absorption line features were detected at 4.1 keV from X 1636–536 with the Tenma satellite in the spectra of X-ray bursts (Waki *et al.*, 1984). Similar features were also detected from X 1608–52 and EXO 1747–214 during bursts (Nakamura *et al.*, 1988; Magnier *et al.*, 1989). These features at 4.1 keV may be interpreted as the redshifted Kα absorption line of helium-like iron atoms. However, such interpretation requires extremely soft equation of state for the nuclear matter, and confirmation with high resolution detectors is urged (Lewin *et al.*, 1993). To investigate the line features, we observed X 1636–536 with ASCA for $\sim$ 240 ksec.

2. Analysis and Results

X 1636–536 was observed at seven different epochs from 1993 to 1995. Total of 12 bursts were detected, six of which were observed when the telemetry rate was high. We used only the high bit rate data of SIS and GIS, because the telemetry was saturated for the medium bit rate data.

During the observations, X 1636–536 stayed in the banana state. We could not find any correlation of color/intensity when the bursts occured. We performed model fitting to the spectrum of the persistent emission of

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TABLE 1. Equivalent width of narrow line of burst

Name	A	B
Line Energy [keV]	$4.3^{+0.1}_{-0.7}$	$4.0^{+0.2}_{-0.1}$
Line EW [eV]	42^{+41}_{-36}	41^{+26}_{-25}

each set of data. We adopted two component model consisting of a blackbody and a multi-color disk blackbody (Mitsuda *et al.*, 1984). The fit was acceptable for all cases, but the best-fit disk temperatures were slightly lower than those obtained by Tenma. This may be due to the lower energy range covered by ASCA (Mitsuda *et al.*, 1989). We also investigated the emission line at 6.7 keV. The equivalent width for a narrow line obtained with GIS (EW$= 16 \pm 4$ eV) is larger than the upper limit with SIS (EW $<$ 5 eV) . This may be interpreted that the 6.7 keV emission line is broad.

No burst among the six showed photospheric expansion. We searched for line-like features in the energy spectra of six bursts. Two bursts (A and B) showed a hint of absorption feature in the decay phase, but only upper limits were obtained for other bursts (EW $<$ 40 eV). Significance of the features are, when assumed as an absorption line, 1.96 σ and 2.575 σ for burst A and B, respectively. Best-fit parameters are listed in Table 1. Even if the presence of an absorption features was real, their EW is much smaller than those detected by Tenma, and they could have different origin.

3. Conclusion

Although we detected marginal line-like structure in the spectra of these bursts, the equivalent widths were much smaller than those detected by Tenma. Thus we could not obtain clear reconfirmation of the Tenma results.

References

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