BRIGHT X-RAY STARS NEAR THE GALACTIC CENTER

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Abstract.

This paper report the *ASCA* observations of the three brightest persistent X-ray stars near the Galactic Center: an X-ray burster A1742−294, black hole candidate 1E 1740.7−2942, and unclassified source 1E 1743.1−2843. Emission mechanism is briefly discussed based on the new ASCA results.

1. Introduction

The Galactic Center region draws much attention in every wave band, in conjunction with a possible massive black hole, starburst activity and so on. In order to overview the high energy phenomena, we have performed repeated *ASCA* observations near the Galactic Center, consisting of a few tens of pointings with total exposure of about 1000 ksec. Several new facts are already published (e.g. Koyama *et al.* 1996). This paper is focused on the persistent X-ray stars locating near the Galactic Center. Systematic works on the whole X-ray stars in the Galactic Center region are presented by Sakano *et al.* (1997).

2. Results & Discussion

X-RAY BURSTER: A1742−294

A1742−294 is the brightest persistent X-ray binary near the Galactic Center. Several X-ray bursts have been reported by Pavlinsky *et al.* (1994). We also detected 10 bursts in the total observation time of 115 ksec, hence confirmed A1742−294 to be an X-ray burster. All these bursts showed black body spectra with spectral softening in the decay phase, hence are established to be type-I bursts. At the Galactic Center distance (8.5 kpc), the

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peak intensity of all the bursts is estimated to be below the Eddington limit of a neutron star. A1742−294 also exhibited a long-term variability by a factor of 3 in 3.5 years.

1E 1740.7−2942 ("THE GREAT ANNIHILATOR")

1E 1740.7−2942 is one of the most interesting sources in this region. It exhibits double radio jets (Mirabel *et al.*, 1992), strong hard X-ray emission extending up to 100keV and intermittent 511keV bursts (Bouchet *et al.*, 1991). The X-ray position coincides to the peak of a molecular cloud (Bally & Leventhal, 1991). All together, 1E 1740.7−2942 is referred to be a micro quasar, powered by direct gas accretion from the molecular cloud.

We detected long-term flux variability by a factor of 3, with no spectral change. The spectrum is found to be highly absorbed ($N_H \sim 1.5 \times 10^{23} H\ cm^{-2}$), although the overall spectral shape with 1–10keV is not sufficiently well represented with a single-power law. No significant fluorescent line from neutral iron is found, suggesting that 1E 1740.7−2942 is not in the dense cloud but would be behind it. Thus we infer that 1E 1740.7−2942 is a binary black hole rather than an isolated black hole in the dense cloud.

UNCLASSIFIED OBJECT: 1E 1743.1−2843

1E 1743.1−2843 has been observed many times in the past, but none is clear for the nature of this source. Although long-term variability was found with *ASCA*, neither short-term nor periodic variation was found. The spectrum is fitted by an absorbed power-law model with a photon index $\Gamma \sim 2$, and hydrogen column of $N_H \sim 1.9 \times 10^{23} H\ cm^{-2}$.

The large absorption may suggest that 1E 1743.1−2843 is a background object behind our galaxy, such as an extragalactic AGN. No significant flux above the 35keV band with past observations, which indicates spectral turn-off near the energy 10–30 keV, may rule out the AGN possibility. We hence prefer galactic origin. From the spectral shape, a low mass X-ray binary (LMXB) near the Galactic Center is the most probable candidate. X-ray luminosity is estimated to be $2 \times 10^{36} erg\ sec^{-1}$, a luminosity in which type-I bursts are expected. However, no burst has been detected through long term observations not only with *ASCA* but also with other previous instruments, with perhaps more than 1200ksec exposure in total.

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