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Timing and spectral study of XB 1254-690 using new RXTE PCA data

Arunava Mukherjee (TIFR, INDIA), Sudip Bhattacharyya (TIFR, INDIA)

(Submitted on 20 Jul 2011)

We have analyzed the new Rossi X-ray Timing Explorer Proportional Counter Array data of the atoll neutron star (NS) low-mass X-ray binary (LMXB) system XB 1254-690. The colour-colour diagram shows that the source was in the high-intensity banana state. We have found two low-frequency candidate peaks with single trial significances of ~ 2.65 X 10^{-8} and ~ 7.39 X 10^{-8} in the power spectra. After taking into account the number of trials, the joint probability of appearance of these two peaks in the data set only by chance is ~ 4.5 X 10^{-4}, and hence a low-frequency QPO can be considered to be detected with a significance of ~ 4.5 X 10^{-4}, or, ~ 3.5\sigma for the first time from this source. We have also done the first systematic X-ray spectral study of XB 1254-690, and found that, while one-component models are inadequate, three-component models are not required by the data. We have concluded that a combined broken-powerlaw and Comptonization model best describes the source continuum spectrum among 19 two-component models. The plasma temperature (~ 3 keV) and the optical depth (~ 7) of the Comptonization component are consistent with the previously reported values for other sources. However, the use of a broken-powerlaw component to describe NS LMXB spectra has recently been started, and we have used this component for XB 1254-690 for the first time. We have attempted to determine the relative energy budgets of the accretion disc and the boundary layer using the best-fit spectral model, and concluded that a reliable estimation of these budgets requires correlations among time variations of spectral properties in different wavelengths.

Comments:	16 pages, 6 figures, 4 tables; published in MNRAS
Subjects:	**High Energy Astrophysical Phenomena (astro-ph.HE)**; Galaxy Astrophysics (astro-ph.GA); Solar and Stellar Astrophysics (astro-ph.SR)
Journal reference:	Monthly Notices of the Royal Astronomical Society, 03/2011, Volume 411, Issue 4, pp. 2717-2725
DOI:	10.1111/j.1365-2966.2010.17872.x
Cite as:	**arXiv:1107.3993 [astro-ph.HE]**
	(or **arXiv:1107.3993v1 [astro-ph.HE]** for this version)

Submission history

From: Arunava Mukherjee [view email]
[v1] Wed, 20 Jul 2011 14:51:24 GMT (395kb)

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