XMM-Newton observation of XTE J1807-294

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XMM-Newton

- 3 instruments (EPIC, RGS, OM)
- EPIC cameras (2 MOS, 1 pMOS)
- Camera: 3 modes to accommodate bright sources and improve time resolution

known objects

- SAX J1808.4-3658: first evidence of spin-up neutron star by mass accretion in LMXB
  (Wijnands & van der Klis 1998)
- XTE J1751-305
  (Markwardt & Swank 2002)
- XTE J0929-314
  (Remillard, Swank & Strohmayer 2002)
- XTE J1807-294
  (Markwardt & Swank 2003)

- Feb. 21, 2003: discovered by RXTE
- March 10: Chandea best fit position
  R.A. = 18h06m59.8s, Dec= -29°23'40" (equatins 2000.0: uncertainty about 1")
- March 16: orbital period 40:0471 ± 0.0005 minutes
  (Markwardt et al.)
- March 22: ToO observation XMM-Newton (01579601)
- XTE J1814-338
  (Strohmayer, Markwardt, Swank et al. 2003)

Note: sources are ordered by date of discovery

summary

- The accreting millisecond pulsar XTE J1807-294, discovered by RXTE on February 21, was observed as Target of Opportunity (ToO) by XMM-Newton on March 22, 2003 using the EPIC camera with an exposure of 9.20 s. The source was detected in bright phase with an observed count rate of 33.37 cts/s in the 0.5-10 keV band (3.7 mCrab).
- Using the best fit orbital period of 40:0471 ± 0.0005 minutes reported by Markwardt et al. (ATEL #127) and assuming a circular orbit as first approximation, we derived 4.8 ± 0.1 light-s for the projected orbital radius and an orbital phase of 52700d:74956s (MJDs).
- The barycentric mean spin period of the pulsar was derived as 54259427 ± 0.0000004 ms.
- X-ray pulse profiles of XTE J1807-294 showed both energy and orbital phase dependence. Pulse profiles of XTE J1807-294 show orbital phase dependent changes and variation of the pulse profile. These effects are also seen in other X-ray pulsars due to geometrical effects with respect to the line of sight and physical conditions of the pulsar. The pulse profile and orbital phase are in the range of 0.5-10 keV band.
- When phase 0 orbital period is 40:0471, the folded pulse shows a significantly higher pulse fraction.
- We then performed a detailed analysis for each of the four observed orbits and detected a significantly higher pulse fraction corresponding to orbital phase 3.
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- April 3 & 4: X-ray pulse profile corresponding to orbital phase 3 shows a significantly higher pulse fraction.

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- To study the variation of the spin-pulse profile with orbital phase, we grouped the data in six different phases covering the complete orbital binary, where phase 0 orbital period is 44:06 s. The folded pulse shows a significantly higher pulse fraction.

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