

Evolution of Spectral and Timing Properties of XTE J1118+480 during its 2000 outburst

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Introduction

- ▶ Discovery: March 2000 (Remillard et al., 2000)
- ▶ Location: Ursa Major, R.A.= $11^h 18^m 10^s .79$,
Dec.= $48^\circ 02' 12'' .42$ (Fender et al., 2001)
- ▶ Distance: 1.72 ± 0.1 kpc (Gelino et al., 2006)
- ▶ Distance above the plane: 1.52 ± 0.09 kpc (Gelino et al., 2006)
- ▶ Orbital Period: ~ 4.08 h (Torres et al., 2012)
- ▶ Mass: $\sim 7M_\odot$ (Wagner et al., 2001, Khargharia et al., 2013)
- ▶ Inclination: $68^\circ - 79^\circ$ (Khargharia et al., 2013)

Companion

- ▶ Spectral type: K7-M0 V (Uemura et al., 2000, Wagner et al., 2001)
- ▶ Mass: 0.09-0.5 M_{\odot}

Observation and Data Analysis

- ▶ 3-25 keV RXTE/PCA data is used for 40 Observations during 2000 Outburst.
- ▶ Heasearc's software package HEADAS version 6.8 and XSPEC 12.8 is used.
- ▶ For Spectral analysis, TCAF model based fits file (v0.3) is used.

Results

Temporal Properties

- ▶ Quasi Periodic Oscillations are observed in Power Density Spectrum (Haswell et al., 2000)
- ▶ Frequencies are very small. (Wood et al., 2000)
- ▶ QPO observed are sporadic.
- ▶ QPO starts from MJD=51634, of frequency= 0.060 Hz.
- ▶ Last QPO at MJD=51710, frequency= 0.163 Hz.
- ▶ In general increasing in nature.

Temporal Properties

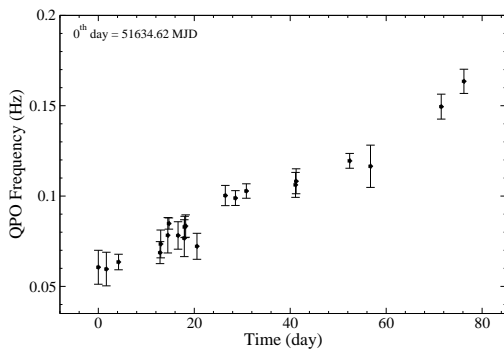


Figure : 1: QPO variation with day

Spectral Analysis

- ▶ **Power law model**

Power law dominated spectra.

Photon Index ~ 1.7

- ▶ **TCAF model:** (Chakrabarti et al., 1995, Chakrabarti, 1997)

Two types of accretion rate-

a. Keplerian rate (\dot{m}_d) in Eddington rate

b. Sub-Keplerian rate (\dot{m}_h) in Eddington rate.

Shock parameters-

c. Shock location (X_s) in r_g

d. Compression ratio ($R = \rho_+/\rho_-$)

Results

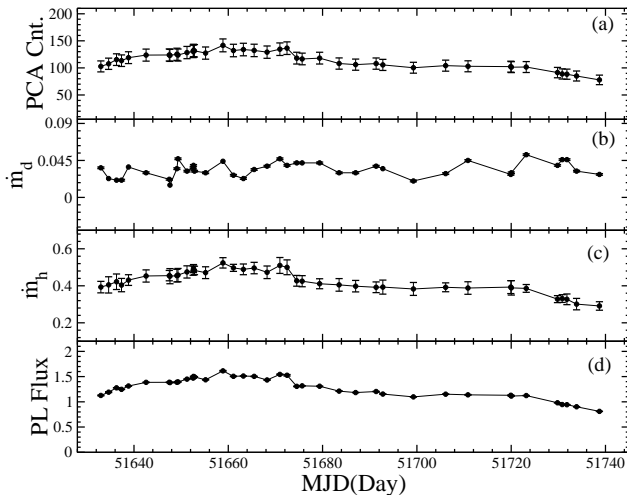


Figure : 2: Variation of (a) PCA count (2-30 keV), (b) disk rate, (c) halo rate, (d) powerlaw flux with day (MJD)

Results

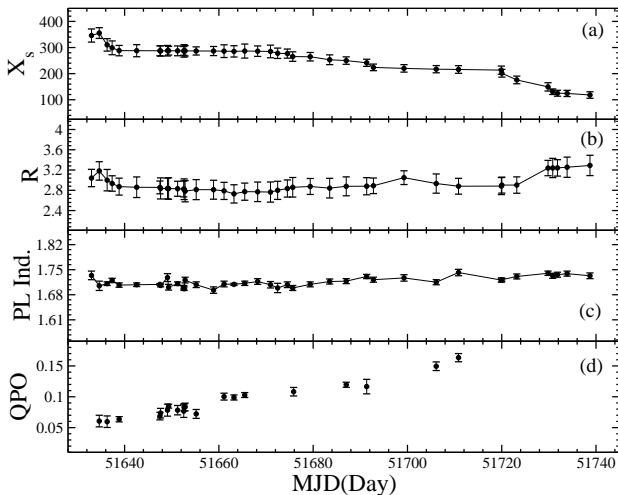


Figure : 3: Variation of (a) shock location, (b) compression ratio, (c) photon index, (d) QPO frequency with day (MJD)

Results

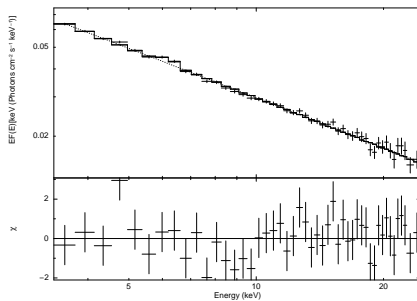


Figure : 4: TCAF spectrum

Results

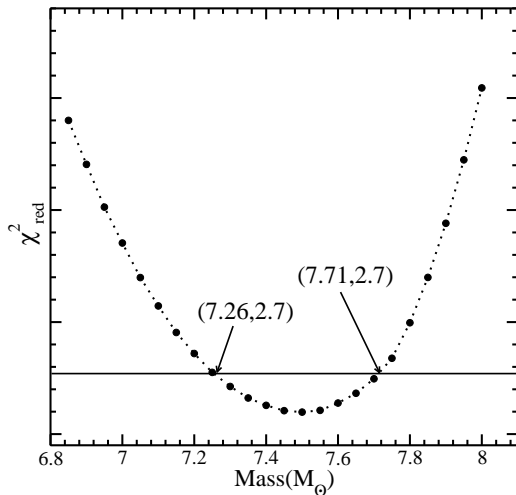


Figure : 5: Variation of Mass with χ_{red}^2

Concluding Remarks

- ▶ Very low frequency QPOs.
- ▶ Hard state outburst.
- ▶ Shock location is very high.
- ▶ Mass $7.5 \pm 0.4 M_{\odot}$

Acknowledgement

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THANK YOU