

MAXI J1836 – 194 : A NEW BLACK HOLE CANDIDATE

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Abstract

Transient sources remain inactive for a long time and show sudden increase in luminosity. They achieve a peak flux and decays back to quiescence. Most of the Black hole sources are transients. They are also observed to exhibit spectral state transitions during their outburst.

MAXI J1836-194 is a transient source detected in 2011. We have analysed the RXTE PCA observations to study the spectral and temporal behaviour of the source during its first outburst.

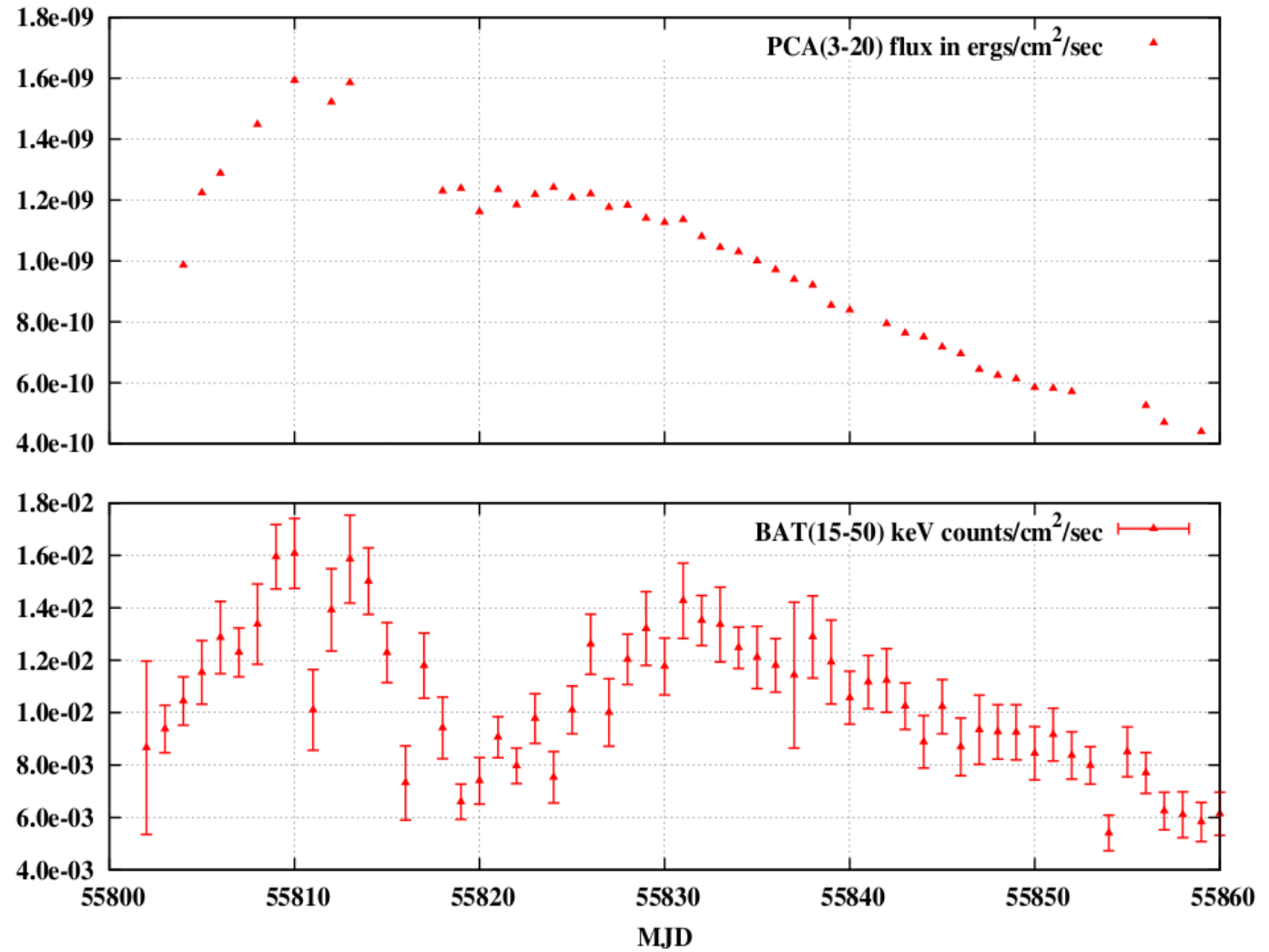
MAXI J1836 – 194

- **1st detected by MAXI GSC at RA(J2000) = 279.12° and Dec(J2000) = -19.41° on 30th August 2011, in 4 – 10 keV band (Negoro et.al.2011, ATEL # 3611)**
- **Also detected by SWIFT BAT in the 15 – 50 keV band (Kennea et.al.2011, ATEL # 3613)**
- **Optical counterpart detected by SWIFT UVOT of magnitude V = 16.20 +/- 0.04 and U = 16.36 +/- 0.04 (Kennea et.al.2011, ATEL # 3613)**
- **RXTE PCA observed from 31st August 2011 (Strohmayer et.al.2011, ATEL # 3618)**
- **Radio lightcurve of the source obtained by RATAN – 600 telescope from 2nd September 2011 (Trushkin et.al.2011, ATEL # 3656)**
- **Different optical and radio observations confirmed the presence of the source (Miller-Jones et.al.2011, ATEL # 3628)**

Light curve analysis

PCA light curve

- 3 – 20 keV
- Rise time = 9 days
- Decay time = 32 days
- FRED profile, with a plateau

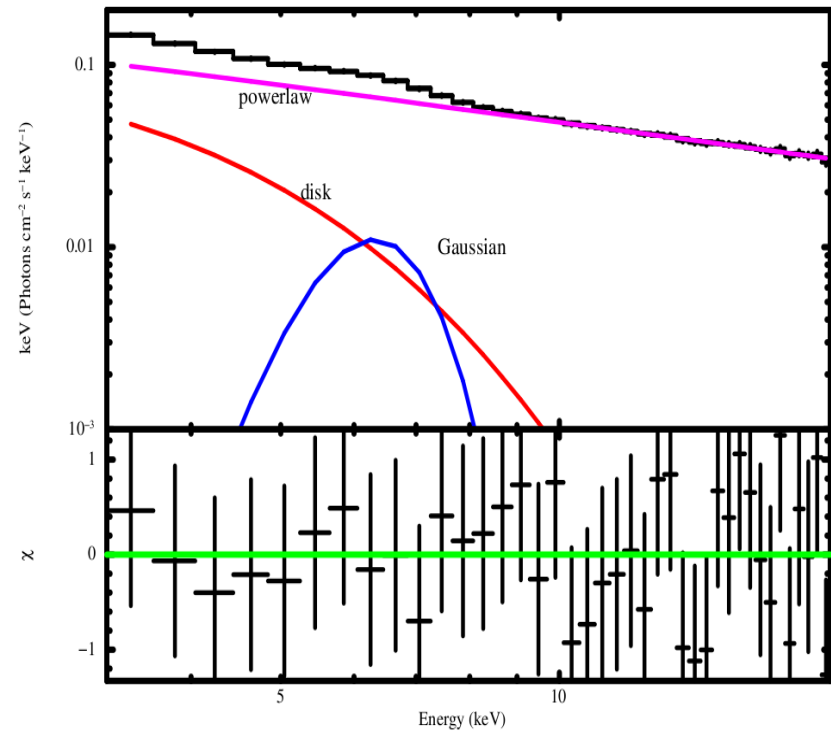


BAT light curve

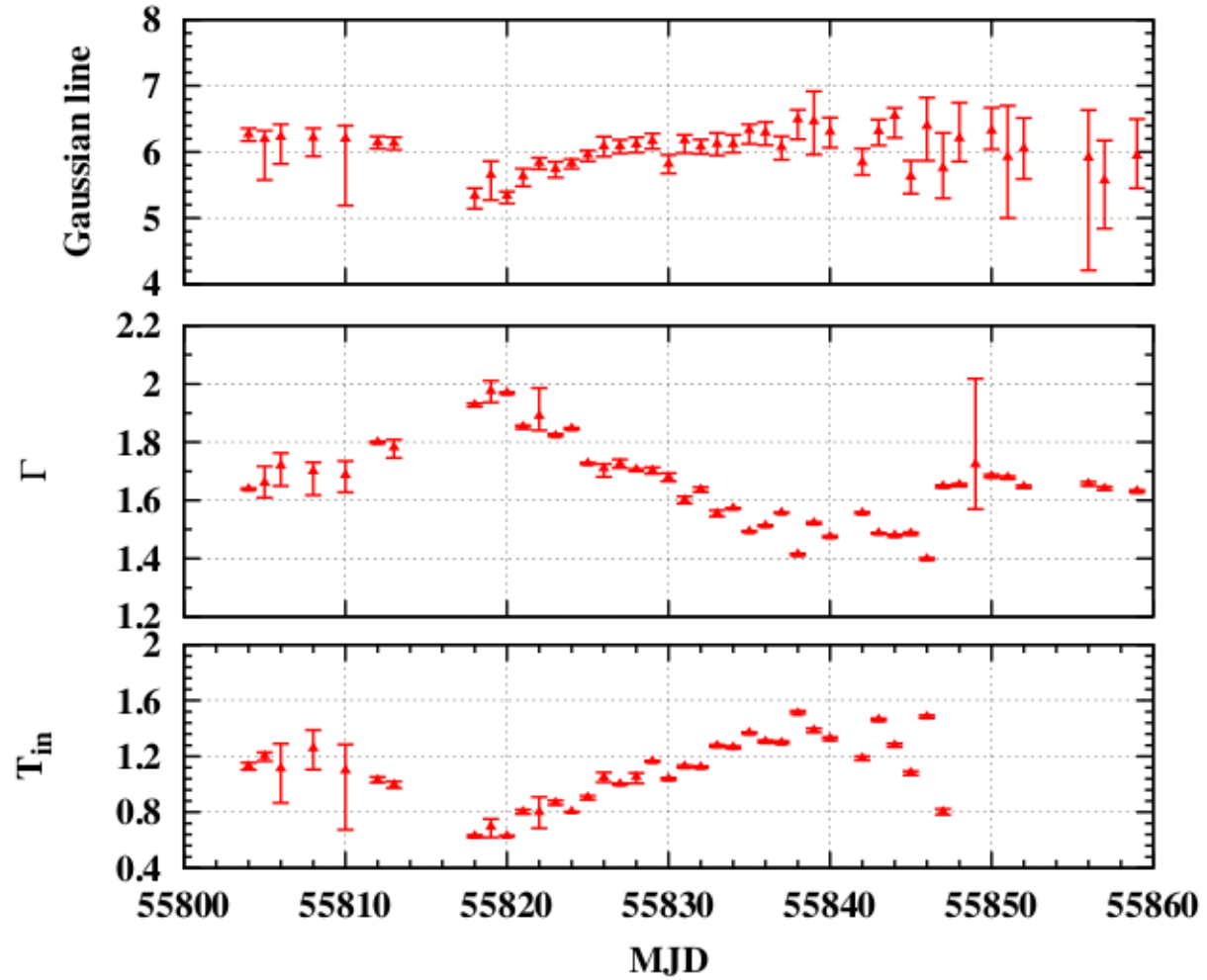
- 15 – 50 keV
- Two peaks, not a FRED profile
- Hard photons dip around the peak

Spectral analysis

Unfolded spectrum for MJD 55810



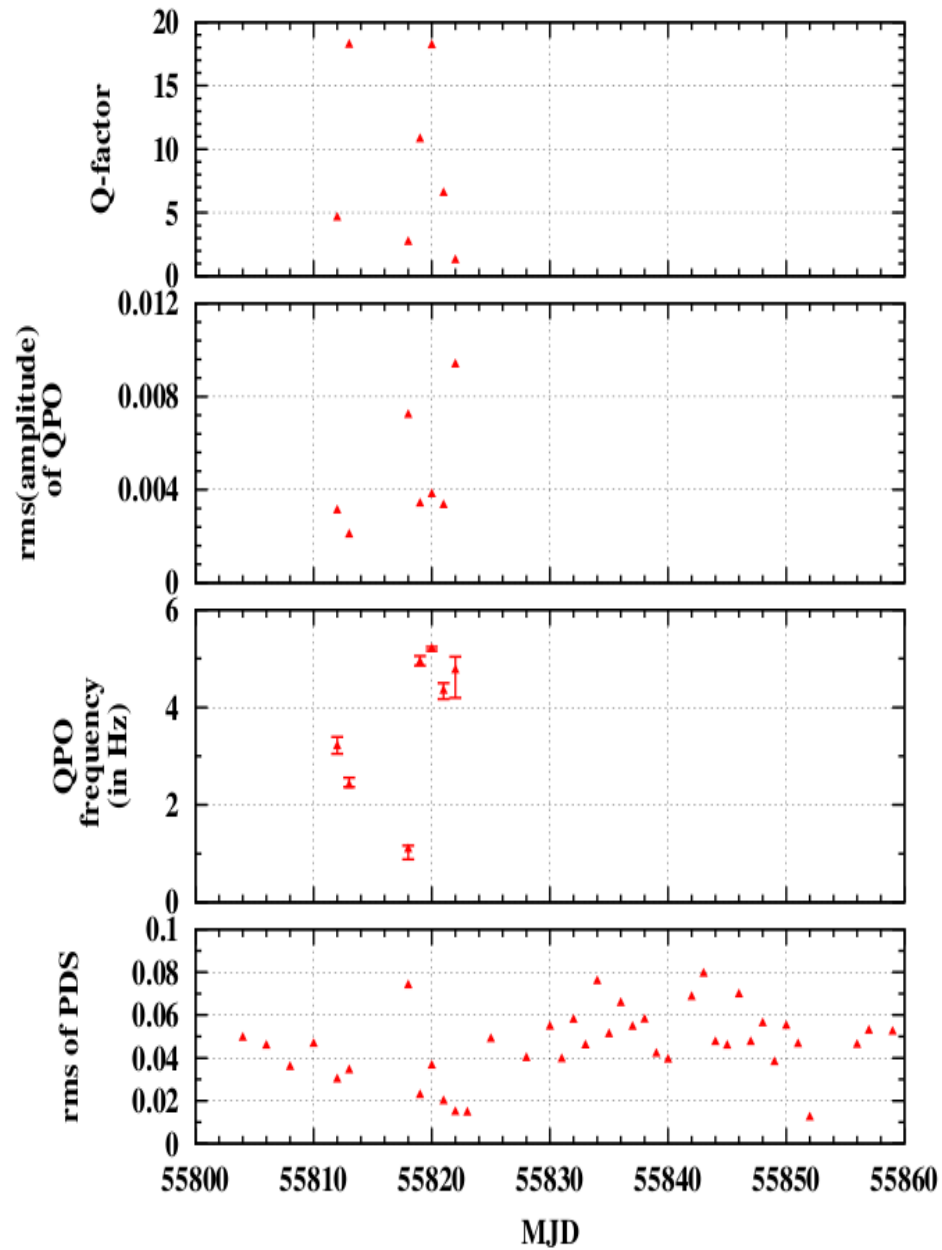
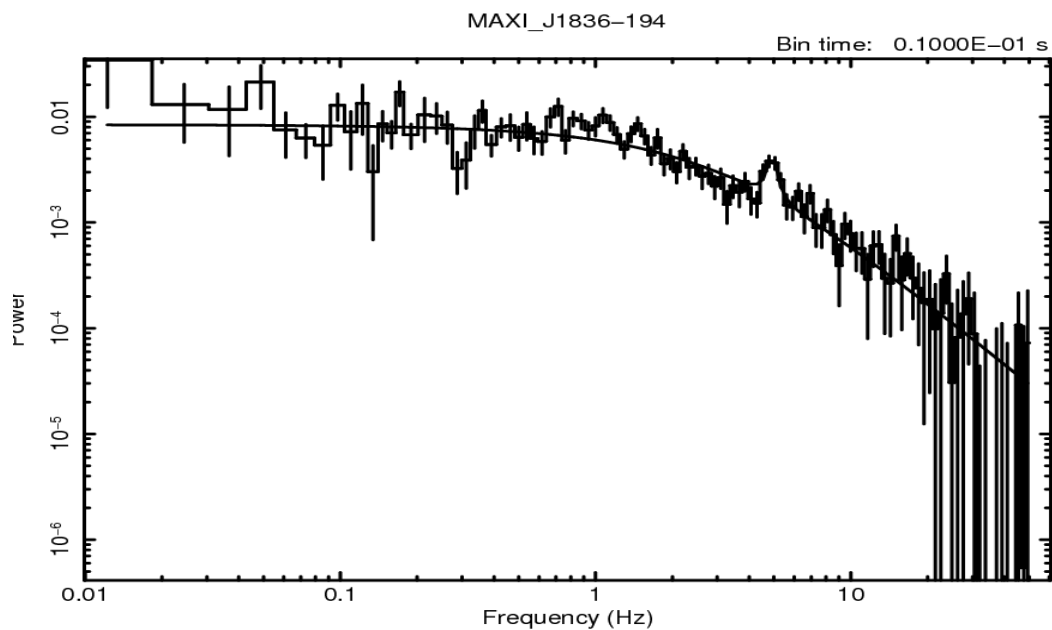
Variation of spectral parameters during the outburst



Timing analysis

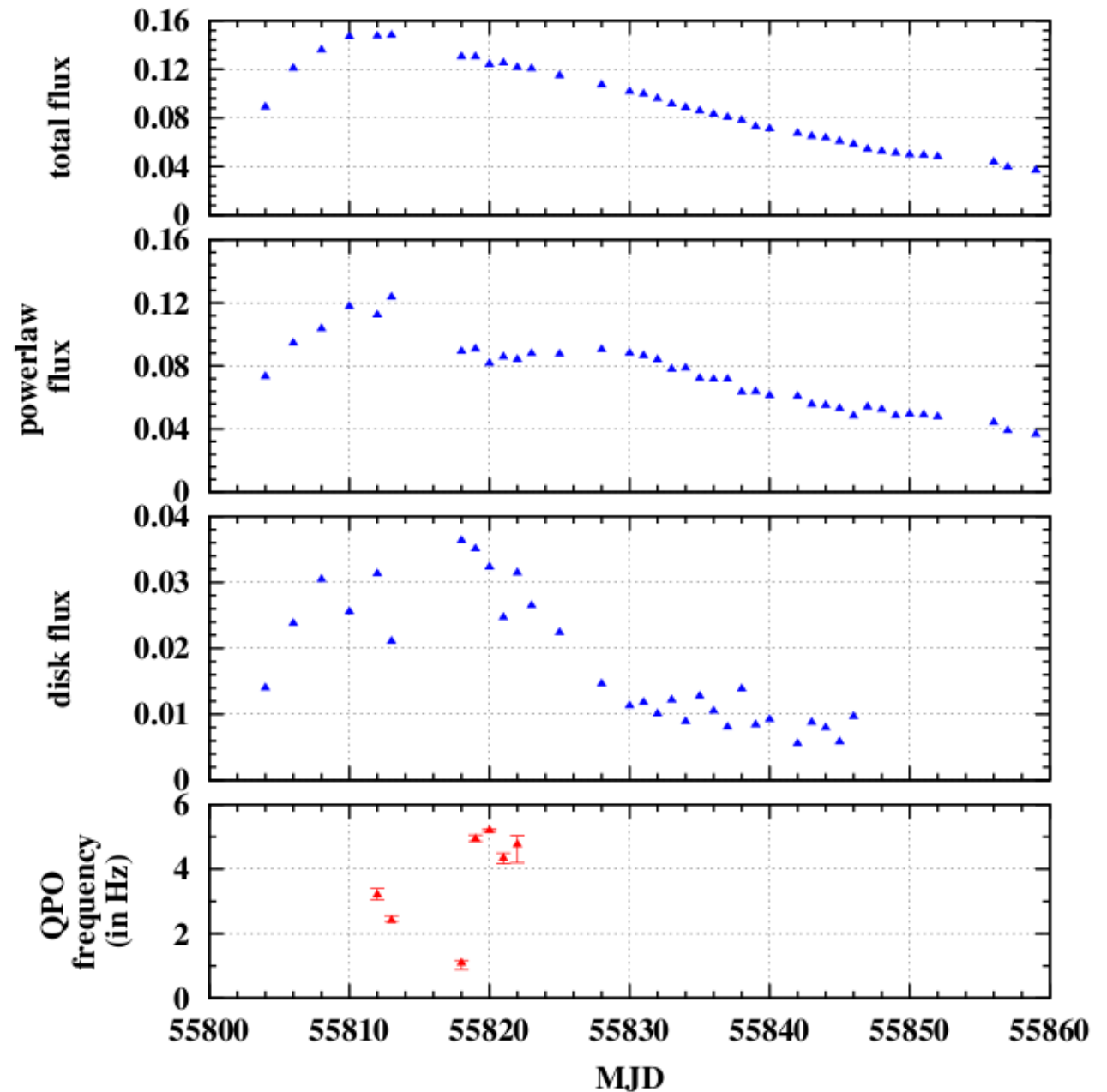
- QPOs seen from MJD 55812 to 55822

PDS for one observation



Variation of component flux(in photons) and QPO frequency

- The powerlaw component dominates throughout the outburst
- The QPO frequency varies in correlation with the powerlaw flux



Discussions

- The source occupies a hard state through out the outburst
- During the rise from MJD 55804 – Low/Hard state
- Around MJD 55818 -- intermediate state
- Decays slowly via intermediate state to a Low/hard state and then to quiescence around MJD 55860
- High/Soft state not observed
- Can be classified as a Low/hard transient
- Presence of QPOs. In the same duration, T_{in} varies from 0.62 keV to ~ 0.8 keV; and Γ varies around 1.9. This is when the source is in the intermediate state
- Hard photons are lagging w.r.t the soft ones
- All the above suggests that MAXI J1836-194 is a Black hole candidate