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*distance estimate and burst oscillations*

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## RXTE detection of a thermonuclear burst from IGR J17498-2921: distance estimate and burst oscillations

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on 18 Aug 2011; 00:40 UT

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Subjects: X-ray, Binary, Neutron Star, Transient, Pulsar

Referred to by ATel #: [3601](#), [3622](#), [3634](#), [3638](#), [3643](#), [3646](#), [3661](#)

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We report the detection of a type I X-ray burst with burst oscillations during an RXTE-PCA observation of the recently discovered accreting millisecond pulsar (AMP) IGR J17498-2921 (ATels [#3551](#), [#3555](#), [#3556](#), [#3558](#), [#3559](#), [#3560](#), [#3561](#), [#3562](#), [#3563](#)). The burst intensity peaked on 2011-08-16 at 15:21:45 UTC. We find a rise time of  $\sim 0.4$ s (time span for burst intensity to go from 25% to 90% of net peak value) and an approximate total duration in the RXTE-PCA bandpass of 30s.

The X-ray (2.5-15 keV) spectrum is well described throughout the burst by an absorbed blackbody model (nH fixed at  $3e22 \text{ cm}^{-2}$ ; ATel [#3555](#)), showing a clear cooling tail typical of thermonuclear (type I) X-ray bursts (kT decreasing from  $\sim 2.6$  to  $\sim 1.4$  keV along the burst decay). This confirms the source as a thermonuclear burster (ATel [#3560](#)), and makes IGR J17498-2921 the 7th out of the 14 currently known AMPs to show thermonuclear bursts.

The burst light curve shows two peaks: a local intensity maximum followed by the global intensity maximum about 2s later. We find evidence for a moderate photospheric radius expansion (PRE) phase during the burst rise and peaks, followed by a temperature increase (from  $\sim 1.8$  to 2.6 keV) simultaneous with a (factor of 3) radius decrease. After "touchdown" the apparent emitting area remains roughly constant. We measure a maximum burst bolometric net flux of  $5.6e-8 \text{ erg/cm}^2/\text{s}$ . Assuming that the maximum luminosity was equal to the value found for PRE bursts (3.8e38 erg/s; Kuulkers et al. 2003, A&A, 399, 663), we estimate a distance to IGR J17498-2921 of 7.6 kpc. The total radiated burst energy at 7.6kpc was  $\sim 3.2e39 \text{ erg}$ .

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Oscillations at a frequency consistent with the persistent pulsar frequency (~401 Hz; ATel #3556) are detected during a 2-3 second interval in the tail of the burst after the PRE episode. The average pulsed amplitude (measured as the half-amplitude) during this interval corresponds to approximately 240 counts/sec, which is significantly larger than the 9 counts/sec half-amplitude of the persistent pulsations before the burst. This confirms that the burst flux must be modulated at the spin frequency.

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