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RXTE observations strengthen the similarities between the black hole candidates IGR J17091-3624 and GRS 1915+105.

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 on 20 Apr 2011; 19:14 UT

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Subjects: X-ray, Binary, Black Hole, Transient

Referred to by ATel #: [3418](#), [3913](#), [4773](#)

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We report on the RXTE follow up observations of the black hole candidate IGR J17091-3624 (ATEL #[3144](#), #[3159](#), #[3167](#), #[3203](#)) after the report of mHz quasi-periodic oscillations (QPO -- ATEL #[3225](#)) and 'heartbeat' oscillations similar to those of GRS 1915+105 (ATEL #[3230](#)).

The 'heartbeat' oscillations first seen on March 19th (ATEL #[3230](#)) at ~25 mHz were also observed in all, except 3, of the subsequent 18 RXTE observations (see below). Since March 19th the frequency of the 'heartbeat' oscillations increased with time, reaching a maximum of ~100 mHz on April 18th, 2011 (UT 16:11:00). As the frequency of the 'heartbeat' increased, we found that sometimes they occurred more irregularly (i.e. less coherently) and at times some 'beats' were missing.

The exceptions occur on March 23, 24 and 25, 2011. In the first two cases the light curve showed very weak variability (A few percent fractional rms amplitude) with a period of ~80 and ~60 sec, respectively. During the third observation we do not detect any significant variability at such timescales.

In an observation performed on April 19th, 2011 (UT 19:05:05, ~2.6 ksec), the light curve of IGR J17091-3624 shows a broad variety of complex behavior, which includes periods of large variability similar to the 'heartbeat' oscillations (at an average frequency of ~150-200 mHz) that alternate with quiet intervals. At the beginning of these periods, the intensity is low, increasing exponentially until it reaches a peak, after which the intensity

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- 3913 The black hole candidate IGR J17091-3624 is still active
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starts decreasing down to the moment the 150-200 mHz oscillation switches on again. These quiet periods last from tens of seconds up to ~100 seconds. For representative light curves, please see:

<http://web.me.com/tbelloni/BlackHoleTransients/IGR17091.html>

Although the timescales are different, the type of variability we observe in April 19th observation of IGR J17091-3624 resembles that of the "beta" class of light curve variations seen in the BHC GRS 1915+105 (Belloni et al. 2000, A&A, 355, 271).

Preliminary analysis also reveals the presence of a QPO at 5-8 Hz which appears to occur only during low intensity periods. This is also very similar to that found for GRS 1915+105 during the "beta" class (see, e.g., Markwardt et al, 1999, ApJL, 513, 37), strengthening the similarities between sources.

Further RXTE and Swift observations are planned. Observations at all wavelengths are strongly encouraged to follow the evolution of IGR J17091-3624.

3299	RXTE observations strengthen the similarities between the black hole candidates IGR J17091-3624 and GRS 1915+105.
3266	Multiple evolving peaks in the power density spectrum and the spectral transition were detected in IGR J17091-3624
3264	A possible IR counterpart to the transient X-ray pulsar IGR J17480-2446 in Terzan 5
3232	Radio detection in 2003 of IGR J17091-3624
3230	IGR J17091-3624 undergoes 'heartbeat' oscillations similar to those of GRS 1915+105
3229	INTEGRAL observations suggest IGR J17098-3628 is not the source of 10 mHz QPOs
3225	Discovery of 10 mHz quasi-periodic oscillations likely from IGR J17091-3624
3203	The soft spectral state of the black hole candidate IGR J17091-3624 observed by INTEGRAL and Swift
3179	RXTE observes fast QPO evolution in IGR J17091-3624 indicating possible state transition
3168	0.1 Hz QPOs during RXTE observations of IGR J17091-3624
3167	Radio emission from IGR J17091-3624 observed with the ATCA
3159	INTEGRAL observations of the BHC IGR J17091-3624 in outburst
3150	The optical and near-infrared counterpart to IGR J17091-3624
3148	Swift/XRT Observations Confirm that IGR J17091-3624 is in Outburst
3144	Swift/BAT reports renewed activity from IGR J17091-3624
3044	Terzan 5 transient IGR J17480-2446: return of thermonuclear bursts or were they always there?
3000	Type-II bursts from the new Terzan 5 transient: a GRO J1744-28 analogue?
2974	Chandra Identification of the Transient in Terzan 5: Not the 2000 Transient.
2958	Discovery of mHz QPOs and burst rate evolution in the active Terzan 5 neutron star transient
2952	D. Altamirano (Amsterdam), J. Homan (MIT), M. Linares (MIT), A. Patruno (Amsterdam), Y. Yang (Amsterdam), A. Watts (Amsterdam), M. Kalamkar (Amsterdam), P. Casella (Southampton), M. Armas-Padilla (Amsterdam), Y. Cavecchi (Amsterdam), N. Degenaar (Amsterdam), D. Russell (Amsterdam), R. Kaur (Amsterdam), M. van der Klis (Amsterdam), N. Rea (CSIC-IEEC), R. Wijnands (Amsterdam)
2946	A Refined Orbital Solution and the Transient Pulsar in Terzan 5 is Not Eclipsing
2940	INTEGRAL and RXTE spectral analysis of IGR J17480-2446, the new transient in Terzan 5.
2939	A preliminary orbital solution for the transient eclipsing pulsar in Terzan 5

2937	Eclipsing X-ray Burster in Terzan 5: Improved Swift Localization
2933	The Eclipsing X-ray Burster in Terzan 5 is Probably Not the 2000 Transient
2932	Discovery of 11 Hz burst oscillations from the 11 Hz Eclipsing Pulsar in Terzan 5
2929	EXO 1745-248 is an 11 Hz Eclipsing Pulsar
2924	Further INTEGRAL observations of the transient X-ray burster EXO 1745-248
2922	Swift follow-up observations of EXO 1745-248
2920	Swift-XRT location of the ongoing Terzan 5 outburst
2919	A hard X-ray transient in the direction of Terzan 5 detected by INTEGRAL
1140	Swift/XRT Observations of IGR J17091-3624 and IGR J17098-3628
494	Optical counterpart to IGR J17098-3628
478	Optical/NIR imaging of IGR J17098-3628 and IGR J16283-4838
444	New X-ray transient IGR J1709.8-3628 discovered with INTEGRAL
160	BeppoSAX measurements of IGR J17091-3624 = 1SAX J1709-36
152	Possible radio counterpart to IGR J17091-3624
150	IGR J17091-3624 in archival data of MIR/KVANT/TTM
149	IGR J17091-3624

[[Telegram Index](#)]

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