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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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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.

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