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## The optical counterpart of the accreting millisecond X-ray pulsar IGR J17498-2921

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on 1 Sep 2011; 12:10 UT

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

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We report the optical detection of a faint star consistent with the known position of the 401 Hz transient accreting millisecond X-ray pulsar IGR J17498-2921 (ATel #[3551](#), #[3555](#), #[3556](#), #[3558](#), #[3559](#), #[3560](#), #[3561](#), #[3562](#), #[3563](#), #[3568](#), #[3601](#), #[3606](#)). On 2011-08-25 and 2011-08-26 (MJD 55798.4 - 55799.5) we observed the field of IGR J17498-2921 with the 2-m Faulkes Telescope South (located at Siding Spring, Australia). Three images in the SDSS i'-band filter and three in R-band were made on 2011-08-25 (each 100-second exposures; the airmass was 1.02), and five images in the i'-band (200-second exposures; the airmass was 1.21-1.27) were made on 2011-08-26. The images in each filter were aligned and combined.

From the summed i'-band images taken on 2011-08-26 (total exposure time 1000 seconds), one faint source is seen at a position consistent with both of the two 0.6" X-ray Chandra error circles (ATel #[3559](#), #[3606](#)) and the 0.1" position of the proposed near-infrared (NIR) quiescent counterpart (ATel #[3562](#)). Below is a link to our optical finding charts. We matched stars in the image to those in the 2MASS catalogue to achieve astrometric calibration. The position of this faint star is RA (J2000) = 17h 49m 55.4s, Dec (J2000) = -29d 19' 19.6" with an error circle of ~0.3". The significance of the detection is 4 sigma. The field is crowded and the faint star lies 4" from a group of much brighter

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stars. We inspected each of the five 200-second exposures and there are no bad pixels or cosmic rays. From the summed R-band and i'-band images on 2011-08-25 (totalling 300 seconds on source in each filter) no star is seen ( $< 3$  sigma) at the same position, although the depth of these images is poorer than the combined image on 2011-08-26.

The faint star detected on 2011-08-26 is likely to be the optical counterpart of IGR J17498-2921, although follow-up observations are required to test for variability. We analysed RXTE PCA data closest in time to our optical observation (~6 hours after; MJD 55799.78). The source was at an average flux of ~35 mCrab, measured in the 2-16 keV band. As the source fades or brightens in the coming weeks, we also expect variations of the optical counterpart. Flux calibration was achieved using several USNO-B1 stars with known R and I-band magnitudes in the field. To estimate SDSS i'-band magnitudes of several field stars from the R and I magnitudes, we used the conversion of [Jordi et al. 2006, A&A, 460, 339](#). The magnitude of the proposed optical counterpart is  $i' = 22.5 \pm 0.7$ , where the error is dominated by the systematic uncertainty from USNO-B1 magnitudes. Multi-wavelength observations are encouraged while this source is still in outburst.

The Faulkes Telescope observations are part of an on-going monitoring campaign of ~30 low-mass X-ray binaries ([Lewis et al. 2008, arXiv:0712.2751](#)). The Faulkes Telescope South is maintained and operated by Las Cumbres Observatory Global Telescope Network. FL acknowledges support from the Dill Faulkes Educational Trust.

*Optical finding charts for IGR J17498-2921*

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