The neutron star LMXB 1RXS J180408.9-342058 transitioned to a soft X-ray state


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The neutron star low-mass X-ray binary 1RXS J180408.9-342058 started an accretion outburst in 2015 January (ATel #6997) and has remained active since. Around April 3, a significant drop in the hard (15-50 keV) X-rays is seen by Swift/BAT, whereas an increase in the softer X-rays (2-10 keV) is seen by MAXI. This suggests that the source has transitioned to a soft X-ray spectral state.

Pointed Swift/XRT observations show that in February-March the source was in a hard X-ray spectral state. Radio jets were detected and the 0.5-10 keV X-ray spectrum was adequately described by a simple absorbed power-law model with a hydrogen column density of N_H≈5×10^{21} cm^{-2}, a photon index of Gamma≈1.1 and an unabsorbed flux of ~(0.5-3)×10^{-9} erg cm^{-2} s^{-1} (ATEls #7039, #7255). At the estimated distance of 5.8 kpc (ATel #4050), this translates into a 0.5-10 keV luminosity of ~0.2-1×10^{37} erg s^{-1}. However, Swift/XRT observations obtained on April 3 (1.1 ks) and April 6 (1.0 ks) show that the source brightened and that its X-ray spectrum softened. The 0.5-10 keV spectrum can now be described by a combination of a kT_{disk}=0.09+/−0.02 keV disk black body, a hotter kT_{bb}=0.9+/−0.1 keV black body, and a Gamma=1.75+/−0.15 power law (with N_H=(0.8+/−0.2)×10^{21} cm^{-2}). The inferred unabsorbed flux of ~(1-1.5)×10^{-8} erg cm^{-2} s^{-1} translates into a luminosity of ~(4-6)×10^{37} erg s^{-1} at 5.8 kpc (0.5-10 keV). These two Swift/XRT observations show two absorption features around ~7 and ~8 keV that could possibly correspond to ionized iron and may indicate the presence of an accretion disk wind. These properties are indeed characteristic of a soft X-ray spectral state.

Swift/XRT monitoring of 1RXS J180408.9-342058 is ongoing. Multi-wavelength observations are encouraged.
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