Swift XRT and UVOT Investigation of Low-Mass X-Ray Binary 1RXS J180408.9-342058

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The radii of neutron stars are difficult to determine, and a better understanding of neutron star spectra would help improve radius estimations. Here, the spectra of observations taken by the Swift X-ray Telescope (XRT) of the neutron star in the low-mass X-ray binary (LMXB) 1RXS J180408.9-342058 were analyzed. Using the spectral continuum method, a determination of radius was attempted. The spectra were best modeled using a blackbody to account for thermal emission and a power law to account for the inverse Compton effect. The model parameter values and the radius are reported for each of the observations, providing a longer-term look, by sevenfold, at the star's outburst behavior. Few neutron star outbursts have been spectroscopically traced in this way. Because the color correction factor is unknown, a physically realistic radius could not be calculated; therefore, the minimum and maximum color correction factors for each observation were determined using realistic radii from the literature. An analysis of UV wavelengths was also conducted using data from the Swift Ultraviolet/Optical Telescope (UVOT). This study is one of the first to trace the UV and X-ray thermal evolution simultaneously for a LMXB with a transient neutron star. In one of the clearest detections to date, the UV flux was determined to be due to reprocessed emission.

Awards Won:
Second Award of $2,000