RXTE Observations of the Low-Mass X-Ray Binary 4U 1608-522 in Upper-Banana State

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To investigate the physics of mass accretion onto weakly-magnetized neutron stars, 95 archival RXTE datasets of an atoll source 4U 1608-522, acquired over 1996-2004 in so-called upper-banana state, were analyzed. The object meantime exhibited 3-30 keV luminosity in the range of <~ 10^35 - 4 x 10^37 erg s^-1, assuming a distance of 3.6 kpc. The 3-30 keV PCA spectra, produced one from each dataset, were represented successfully with a combination of a soft and a hard component, of which the presence was revealed in a model-independent manner by studying spectral variations among the observations. The soft component is expressed by so-called multi-color disk model with a temperature of ~1.8 keV, and is attributed to the emission from an optically-thick standard accretion disk. The hard component is a blackbody emission with a temperature of ~2.7 keV, thought to be emitted from the neutron-star surface. As the total luminosity increases, a continuous decrease was observed in the ratio of the blackbody luminosity to that of the disk component. This property suggests that the matter flowing through the accretion disk gradually becomes difficult to reach the neutron-star surface, presumably forming outflows driven by the increased radiation pressure. On time scales of hours to days, the overall source variability was found to be controlled by two independent variables; the mass accretion rate, and the innermost disk radius which changes both physically and artificially.

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