A soft X-ray spectral episode for the Clocked Burster, GS 1826-24 as measured by Swift and NuSTAR

We report on NuSTAR and Swift observations of a soft state of the neutron star low-mass X-ray binary GS 1826–24, commonly known as the "clocked" burster. The transition to the soft state was recorded in 2014 June through an increase of the 2–20 keV source intensity measured by MAXI, simultaneous with a decrease of the 15–50 keV intensity measured by Swift/BAT. The episode lasted approximately two months, after which the source returned to its usual hard state. We analyze the broadband spectrum measured by Swift/XRT and NuSTAR and estimate the accretion rate during the soft episode to be $\approx 13\% m_{\text{Edd}}$ within the range of previous observations. However, the best-fit spectral model, adopting the double Comptonization used previously, exhibits significantly softer components. We detect seven type-I X-ray bursts, all significantly weaker (and with shorter rise and decay times) than observed previously. The burst profiles and recurrence times vary significantly, ruling out the regular bursts that are typical for this source. One burst exhibited photospheric radius expansion and we estimate the source distance as $(5.7 \pm 0.2) \xi_{b}^{-1/2}$ kpc, where $\xi_{b}$ parameterizes the possible anisotropy of the burst emission. The observed soft state may most likely be interpreted as a change in accretion geometry at about similar bolometric luminosity as in the hard state. The different burst behavior can therefore be attributed to this change in accretion flow geometry, but the fundamental cause and process for this effect remain unclear.