# Spectra of the LMXB boundary layers in the spreading layer model and the limitation on a neutron star equation of state

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The spectra of the spreading layers on the neutron star surface were calculated on the basis of the Inogamov-Sunyaev model taking into account the general relativity correction to the surface gravity and the solar chemical abundance of the spreading matter. Local (at a given latitude) spectra of the spreading layer are very similar to bursting neutron star spectra and can be fitted by diluted black body spectra with corresponding hardness factors. Total spreading layer spectra have been integrated including light bending, gravitational redshift, and relativistic Doppler effect. The total spectra can also be fitted by the diluted black body spectra. The total spectra slightly depend on the inclination angle of the neutron star spin axis to line of sight and on the spreading layer luminosity. Therefore, it is shown that color temperatures of the spreading layer spectra depend mainly on a neutron star $M/R$ relation.

As has been demonstrated by Gilfanov et al. (2003) the boundary layer spectra in low mass X-ray binaries (LMXBs) can be fitted by the black body spectrum with $T_{\rm col} = 2.4 \pm 0.1$ keV. The limitations on the neutron star $M/R$ relation were obtained by comparing theoretical spreading layer spectra with the observed boundary layer spectrum. These limitations give the neutron star radius $R = 14.6 \pm 2$ km for the mass $M = 1.4\,M_{\odot}$. Such a radius corresponds to a “mean field” model equation of state of neutron star matter.