Absorption features in the spectra of X-ray bursting neutron stars

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Spectral analysis using model-atmosphere techniques is an adequate tool to determine photospheric parameters of neutron stars. Our aim is to identify iron lines in the X-ray range in order to determine $T_{\rm eff}$ of individual neutron stars with low magnetic fields and check the observational results reported early by Cottam et al. (2002). We investigate deviations of LTE and NLTE model atmospheres in the $T_{\rm eff}$ range of neutron stars with a low magnetic field. We have calculated grids of non local thermodynamic equilibrium (NLTE) model atmospheres with different chemical composition at $T_{\rm eff}$ between 1 and 20 MK and compare them with LTE models which, in addition, take into account Compton scattering. Synthetic spectra of LTE and NLTE model atmospheres with identical parameters at wavelengths > 2 Å are in good agreement. Variation of chemical composition (including heavy elements and model atmospheres without hydrogen) does not change the theoretical spectra qualitatively. Compton scattering is very important for hottest ($T_{\rm eff} \geq 15$ MK) model atmospheres. Atmospheres of neutron stars with solar chemical composition can be considered without Compton scattering at lower $T_{\rm eff}$. It is shown that absorption lines of FeXXIV – FeXXVI ions dominate at wavelengths 8–14 Å and at $T_{\rm eff} = 5 - 12$ MK. The absorption lines within this band are very weak at higher temperatures. The identification of FeXXV and FeXXVI absorption lines formed at the stellar surface of EXO 0748−676 cannot be verified, neither by NLTE nor by LTE model-atmosphere spectra. If real, they stem rather from FeXXIV at $z \approx 0.24$.