

On the nonrelativistic origin of redskewed iron lines in CV, neutron star and black hole sources

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We present an XMM-Newton data analysis of the K_α line detected in the cataclysmic variable (CV) GK Per. We discover, using data from EPIC PN, that the iron K_α emission line of GK Per has a noticeable redskewed profile. We compare the GK Per asymmetric line with the redskewed lines observed by XMM-Newton in the neutron star (NS) source Serpens X-1 and the black hole (BH) source BH GX 339–4. The observations of the K_α emission with redskewed features in CV GK Per indicate that the red skewness of the line cannot be a BH particular signature related to the redshift effects of General Relativity (GR). If the mechanism of the K_α -line formation is the same in CVs, NSs and BHs then it is evident that the GR effects would be ruled out as a cause of red skewness of the K_α line. Moreover, recently an alternative model for broad red-shifted iron line formation in the outflowing wind has been suggested. The outflow is a common phenomenon for CVs, NSs and BHs. In this presentation, we demonstrate that the asymmetric shapes of the lines detected from these CV, NS and BH sources are well described with the wind (outflow) model that strongly supports a wind origin of the line in all these sources. Furthermore, we demonstrate that, when the strong redskewed iron line is observed in GX 339–4, the power spectrum is featureless and noisy. However, when the line is weak and almost symmetric, the power spectrum shows a clean feature of a broken power-law (white-red noise component) and two Lorentzians! The strong redskewed iron line is presumably formed in the strong extended wind due to its illumination by the radiation emanating from the innermost part of the object. On the other hand, this strong wind should wash out all particular features of the power spectrum making it highly noisy at all frequencies.