Astronomy and Astrophysics 2008 vol.491 N2, pages 525-529

# Influence of Compton scattering on the broad-band X-ray spectra of intermediate polars

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## Abstract

Context. The majority of cataclysmic variables observed in the hard X-ray energy band are intermediate polars where the magnetic field is strong enough to channel the accreting matter to the magnetic poles of the white dwarf. A shock above the stellar surface heats the gas to fairly high temperatures (10-100 keV). The post-shock region cools mostly via optically thin bremsstrahlung.Aims. We investigate the influence of Compton scattering on the structure and the emergent spectrum of the post-shock region. We also study the effect it has on the mass of the white dwarfs obtained from fitting the observed X-ray spectrum of intermediate polars. Methods. We construct the model of the post-shock region taking Compton scattering into account. The radiation transfer equation is solved in the plane-parallel approximation. The feedback of Compton scattering on the structure of the post-shock region is also accounted for. A set of the post-shock region model spectra for various white dwarf masses is calculated.Results. We find that Compton scattering does not change the emergent spectra significantly for low accretion rates or low white dwarf masses. However, it becomes important at high accretion rates and high white dwarf masses. The time-averaged, broad-band X-ray spectrum of intermediate polar V709 Cas obtained by the RXTE and and INTEGRAL observatories is fitted using the set of computed spectral models. We obtained the white dwarf mass of 0.90 ± 0.02 M⊙ and 0.88 ± 0.02 M⊙ using models with Compton scattering taken into account and without it, respectively. © 2008 ESO.

http://dx.doi.org/10.1051/0004-6361:200810119

## Keywords

Radiative transfer, Scattering, Stars: atmospheres, Stars: binaries: close, Stars: novae, cataclysmic variables, Stars: white dwarfs