Evolution of compact binaries
ASP Conference Series, Vol. 447
Linda Schmidtobreick, Matthias Schreiber, and Claus Tappert ,eds.

Natural Evolution of SS Cyg Based on an X-Ray Data Analysis at Very Short Periods

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Abstract. We have carried out a Chandra data analysis of the prototype dwarf nova SS Cyg during quiescence and outburst. The SS Cyg data number 646 and 648 were obtained by the Chandra X-Ray Observatory on August 24, 2000 in quiescence and on September 14, 2000 in outburst were analysed. The evolution of the X-ray spectrum variation at very short periods was investigated. We discuss how situations that result from interaction are affected by the natural evolution of the system's attributes.

1. Introduction and Analysis

Cataclysmic variables (CVs) are binary stars in which the secondary star fills its Roche lobe and starts transferring mass into the lobe of the compact primary. The transferred material has too much angular momentum to fall directly onto the surface of the white dwarf, but instead builds an accretion disc, which spirals around the white dwarf. The matter in the disc will be accreted onto the white dwarf if it looses its angular momentum. The matter in the disc looses its angular momentum gradually and moves toward the accreting star. SS Cyg is in the class of dwarf novae in which the secondary star is a red dwarf-type star while the primary star is a white dwarf. The red dwarf and the white dwarf in SS Cyg are separated by about 160 900 km. The closeness of the stars lets them complete their orbital revolution in 6.5 hours. Observations show that SS Cyg is fairly close to the Sun at a distance of about 28 to 31 pc. The inclination of the system has been calculated to be about 50°, yielding a respective component mass of $M_{\rm wd}$ = $0.60M_{\odot}$ and $M_{\rm ms}$ = $0.40M_{\odot}$ (Eze 2007).

Chandra;

OB ID	**Ob Date**	**Exposure(s)**	**State**
646	2000-08-24 10:28:23	4.7347e+4	quiescence
648	2000-09-14 21:09:02	5.9554e+4	outburst

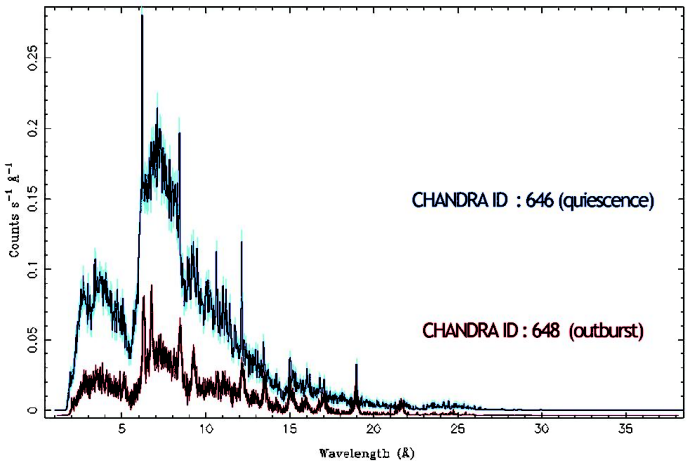

Figure 1. X-ray flux of SS Cyg during quiescence and outburst

2. Conclusion

It is generally well known that in dwarf novae the X-ray flux decreases in outburst and SS Cyg system is an example of this. Figure 1 shows the quiescence and outburst fluxes. SS Cyg is classified as a U Gem type dwarf nova, but it is not behaving like U Gem at this point, since the latter's X-ray flux increases during outburst. On the other hand, in most dwarf novae the X-ray flux decreases during outburst (Eze 2007).

Acknowledgements. This work is supported by Anadolu University under the Scientific Research Project with Project number 091025.

References

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