EMISSION LINE VARIABILITY IN THE Be STAR X-RAY BINARIES 4U1258-61 AND 4U2206+54

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Abstract. Results of programs to monitor Hα emission line variability in two Be star X-ray binaries are presented. These systems provide a means of investigating the influence of a binary companion on the circumstellar envelope of a Be star.

INTRODUCTION

Many Be stars display Hα emission with distinct violet (V) and red (R) peaks. The ratio of peak strengths is generally seen to vary and this has been explained by several different models (see e.g. Poeckert 1982): (1) Mass accretion by the Be star, (2) Mass inflow/outflow, (3) Tidal effects of a binary companion & (4) Precessing elliptical rings.

Those Be stars which are strong X-ray sources may help to decide between different models because: (1) The X-ray flux implies that these objects must be binaries, where the companion is probably a neutron star. (2) In many cases the orbital period is known from measuring the radial velocity of the neutron star or the recurrence time for X-ray flares. Therefore, if a Be star X-ray binary is observed we may determine whether there is any correlation between orbital phase and the V/R ratio. The results will be of particular importance for γ Cas which has a neutron star companion (of unknown orbital period) and exhibits V/R variations (e.g. Marlborough et al. 1978).

4U1258-61

The X-ray flux from the X-ray binary 4U1258-61 is modulated with a 133d period which is interpreted as the orbital period of the system. Optical spectra of 4U1268-61 show an apparent dependence of V/R on 133d phase (Corbet et al. 1986). However, this result has only a ~90% significance and the data do not fully cover all phases. 4U1258-61 is now in an inactive phase with no optical emission lines or detectable X-ray flux and so this result cannot yet be confirmed.

4U2206+54

4U2206+54 is a $\sim 10^{35}$ erg s^{-1} X-ray source, identified by Steiner et al. (1984) with a V~10 Be star with double peaked Hα emission. This star has been selected for a detailed study because of its brightness and the clear separation of the V and R components. Service spectroscopy is being undertaken at the 2.5m Isaac Newton Telescope in order to search for periodic variations in the V/R ratio and line strength.

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To date six spectra have been obtained. Hα is seen in emission in all spectra, as is HeI λ6678 in the best quality spectra. In order to parameterise this variability the H α line was fitted with a combination of two gaussians plus quadratic continuum (see table). Changes are apparent but many more spectra are needed before a periodicity search can be made.

References

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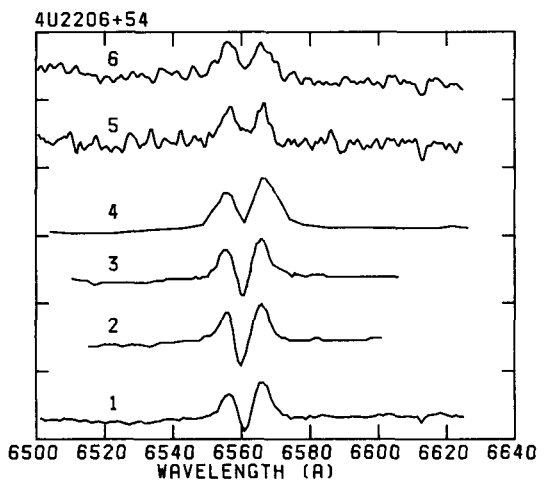
Observations of 4U2206+54

	J.D. (-2440000)	V E.W. (A)	R E.W. (A)	V/R
1	6222.758	1.4	2.2	0.6
2	6516.757	1.0	1.5	0.7
3	6541.736	1.2	1.5	0.8
4	6577.750	2.3	3.8	0.6
5	6645.750	2.5	1.9	1.3
6	6646.750	2.6	2.7	1.0

Figure Caption

Spectra of 4U2206+54 showing details of Hα.



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DISCUSSION FOLLOWING CORBET

Buscombe:

What is the spectroscopic resolving power at the various phases illustrated? From the noise level it appears to be quite inhomogeneous.

Corbet:

Dispersions range from $\sim$ 30 - 60 Å/mm and the typical resolution is $\sim$ 1-5 Å.

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