ROTATIONAL DISTURBANCE IN BG CMI

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Abstract. I report on the independent discovery of a feature in BG CMi which resembles a rotational disturbance (RD). A similar effect has already been reported in the He II λ 4686 line, whereas here it is seen in the *Balmer* lines, 0.25 orbital cycles prior to that reported previously. These results suggest that BG CMi is at a relatively high inclination.

1. The data

These data have been published before (see Garlick et al. 1994 for details), but that paper was limited to a spin-resolved analysis. Here, I present the results of an orbital analysis. The left panels of Fig. 1 show the V/R ratio (top) and the intensity in arbitrary units (bottom) of the Balmer lines of BG CMi, rebinned and plotted against orbital phase (Patterson & Thomas 1993). Data from the *wings only* (400...1400 km s^{-1}) of Hδ–Hβ are included. There is a strong feature near phase 0.7...0.8 which is very much like a classic RD. The feature was fully covered only on the first night, but there is clear evidence for a redward excursion in the Balmer line V/R ratio just before the coverage stops, at phase 0.75, on the second night. There is also evidence for an increase in the V/R ratio at phase zero—at the same phase as an RD reported previously but in the He II line (de Martino et al. 1995). In the He II line here, however (Fig. 1, right), no activity is seen in the V/R ratio, whilst the intensity shows a dip at phase 0.05 and marginal evidence for another at 0.75. These observations suggest that we are seeing evidence for two line eclipses in this system, near phases 0.75 and zero.

2. Interpretation?

A possible interpretation is that the accretion stream hits the edge of a disc, a ring, or the magnetosphere, throwing material out of the orbital

A. Evans and J. H. Wood (eds.), Cataclysmic Variables and Related Objects, 179–180.

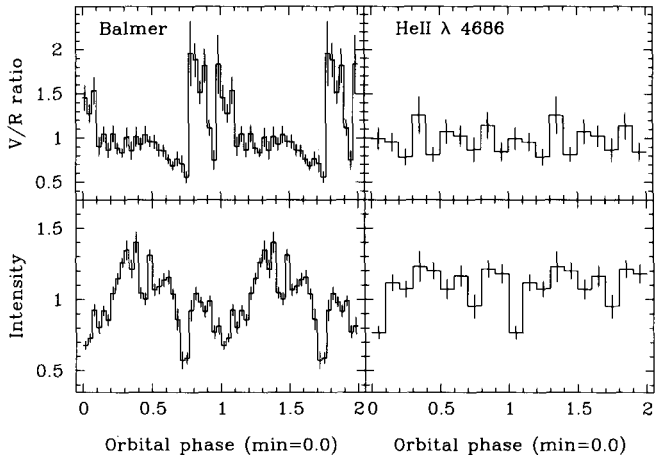

Figure 1. Left: The average V/R ratio (top) and arbitrary intensity (bottom) in the wings of the Balmer lines of BG CMi as a function of phase. Right: the same for the He II λ 4686 data. Fewer phase bins were used because of the weaker signal in He II.

plane. This material, on the observer's side of the white dwarf at phases 0.75...0.90, then obscures first the red- then the blue-shifted regions of the inner edges of the accretion disc, creates an RD in the wings of the Balmer lines, and may also be responsible for the X-ray dips in this system as has already been proposed (Hellier, Garlick & Mason 1994). An eclipse by the secondary star follows ~ 0.25 cycles later.

This simple picture is capable of explaining the phases of the events seen in the data, but raises questions. Most notably: how is it that the Balmer line region suffers RDs at phases 0.75 and possibly phase zero, whilst the He II line merely undergoes a dip in intensity at these phases? A possibility is that the He II region is localised—not in a ring around the white dwarf—and is small enough to be wholly obscured by the thrown up material so that the RD behavior is not seen. However, as an RD in He II at phase zero *was* seen by de Martino et al. (1995), this indicates that significant changes in the whereabouts of the line emission regions in the system have taken place.

In conclusion, these results strongly suggest that BG CMi is at a high inclination and possesses at least a truncated disc.

References

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