SPECTROSCOSCOPIC OBSERVATIONS OF SOUTHERN DWARF NOVAE

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Abstract. The first image-tube spectra of five dwarf novae and one old nova are described and compared with the colours of these stars.

1. Introduction

The present models of cataclysmic variables are based mainly on photoelectric observations (e.g. Smak, 1971; Warner and Nather, 1971; Vogt, 1974). In the past, very few attempts have been made to obtain spectra of southern dwarf novae, in spite of the fact that spectroscopic data supplementing the photometry are essential for an appropriate model development. Therefore between 1974 December and 1975 May several U Gem type stars and one old nova were observed with the Boller & Chivens image-tube spectrograph of the European Southern Observatory, attached to the 1-m telescope at La Silla, Chile. Dispersions of 100 and 260 Å mm^{-1} were used.

2. Description of the Spectra

2.1. *RR Pic* (old nova): continuum with He II (λ 4686) as the only strong emission line; fainter emission features are C III (λ 4650), Balmer series and Pickering series of He II.

2.2. *BV Pup* (dwarf nova, minimum stage): Balmer series, C III (λ 4187 and λ 4650), C II (λ 4267), all in emission.

2.3. *VW Hyi* (dwarf nova):

2.3.1. *Minimum stage:* only Hβ and, possibly, C III (λ 4185) in emission; the continuum intensity is inhomogeneous, showing very broad (~ 100 Å) depressions around the locations of the Balmer lines.

2.3.2. *Long eruption* of Dec. 1974: Balmer series and He I (λ 4471) in absorption, very broad lines. Their equivalent widths do not show any correlation with the 'peak period' of 0.077 days which was present in the light curves of this and of earlier long eruptions (Vogt, 1974). Within two days, however, the mean equivalent widths of the Balmer lines descreased by about 30%.

2.4. *AT Ara* (*dwarf nova, minimum* stage): Balmer series in emission and, possibly, G-band in absorption.

2.5. *MU Cen* (dwarf nova, minimum stage): continuum without strong emission features.

2.6. *BV Cen* (dwarf nova, minimum stage): composite spectrum showing the Balmer series and He I (λ 4026 and 4471) in emission, but Fe I (G-band, λ 4132, 4201, 4272, 4383, 4405) and Ca I (λ 4227) in absorption, corresponding to a late G/early K companion. Preliminary radial velocity measurements of the G-band and Hγ revealed a variable line shift with an amplitude of several hundred km s^{-1}; Their time scale is well compatible with a tentative orbital period of ~0.61 days derived independently from photoelectric

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observations (the period 0.158 days given by Mumford, 1971, is wrong).

3. Comparison between Spectra and Colours

The first three stars of the previous section (2.1–2.3) are extremely blue ($B\text{-}V \approx 0$, $U\text{-}B \approx -1$). Only continuum and emission lines characteristic for high disc temperatures (e.g. He II, C III) are present. No red companions are visible in the spectra, and the orbital periods tend to be rather short ($\lesssim 4$ h). On the other hand, stars 2.4–2.6 are redder ($B\text{-}V \approx 0.6$, $U\text{-}B \approx -0.5$), their spectra show characteristics of lower temperature (e.g. H, HeI in emission), the red companions tend to become visible in the spectra, and the orbital periods are longer ($\gtrsim 12$ h). If this connection between colours and spectral appearance can be established, it would allow predictions of some basic system parameters from *UBV* photometry alone.

References

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