LATE-TYPE Ca II EMISSION-LINE STARS IN THE SOUTHERN HEMISPHERE

A.C. Collier
Physics Department, University of Canterbury,
Christchurch, New Zealand

ABSTRACT

The results of a photometric and spectroscopic study of twenty-three late-type southern stars with strong Ca II H and K emission are presented.

The presence of photometric variability, with similar properties to the photometric wave phenomenon seen in the RS Canum Venaticorum binaries, is noted in thirteen of the fifteen stars for which extensive photometry was obtained. Of twenty stars for which high resolution radial velocity measurements were obtained, ten are found to be single-lined and seven are found to be double-lined spectroscopic binaries. The periods range from 0.66 up to 53.9 days.

Two stars with no radial velocity variations but with high rotational broadening ($v_e \sin i \geq 40$ km s^{-1}) of their spectra are identified as probable new members of the FK Comae group of rapidly-rotating, chromospherically-active late-type giants.

High resolution ($\Delta\lambda < 0.3$ Å) Hα spectra were obtained of twenty-one of the candidate stars. Nine stars show Hα as an emission feature above continuum level. Eight show Hα either absent or unusually shallow, due to filling of the absorption profile with emission. High resolution ($\Delta\lambda < 0.3$ Å) Ca II H and K spectra of ten of the program stars yield line surface fluxes in the range

$$1.6 \times 10^5 \leq F(K_1) + F(H_1) \leq 1.9 \times 10^7 \text{ erg cm}^{-2}\text{s}^{-1}$$

in the H and K emission cores.

The high proportion of single-lined RS CVn binaries in the sample is discussed in terms of selection effects. The space density of RS CVn systems with mass ratios less than $q \simeq 0.8$ is found to be at least equal to that of the $q > 0.8$ systems. This implies a total space density of at least 10^{-5}pc^{-3} for the RS CVn binaries.

P. B. Byrne and M. Rodonò (eds.), Activity in Red-Dwarf Stars, 75–76.

Differences between the RS CVn binaries and the related short-period, long-period and semi-detached G and K binaries with Ca II H and K emission are discussed in terms of evolutionary processes in close binary systems. A space density calculation based on the evolutionary requirements for membership of the RS CVn group is shown to reproduce closely the mass and luminosity distributions among the RS CVn binaries. The theoretical space density of RS CVn systems in the Galactic plane is found to be $1.9 \times 10^{-5} pc^{-3}$ by this method, in reasonable agreement with the observed value.

https://doi.org/10.1017/S0252921100095968 Published online by Cambridge University Press