

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1212

Konkoly Observatory
Budapest
1976 December 2

COPERNICUS OBSERVATIONS OF THE
NON-ECLIPSING RS CVn BINARY HR 1099

Photoelectric spectrum scans of the Mg II h&k and Lyman-alpha emission lines of HR 1099 were obtained in September, 1976 with the ultraviolet spectrometers aboard COPERNICUS (Rogerson et al. 1973). Both spectral regions were scanned continuously throughout two complete orbital cycles. The resolution at Lyman-alpha was 5 m \AA while that at Mg II was 510 m \AA .

Both the Mg II and Lyman-alpha emission features exhibited marked profile and intensity variations over short time scales of less than five hours. In addition, multiple Mg II velocity components ($\pm 200 \text{ Km/s}$) were observed to appear and disappear over similar intervals. The velocity direction of these components was correlated to the orbital motion of the secondary star, that is, they were usually negative when the secondary was approaching the observer, and positive when receding. This result may imply mass transfer from the primary to secondary star in this system. Since the strongest feature was usually observed with the same velocity as the primary, this component is likely the more active star. In addition, Bopp and Fekel (1976) have found the primary to be the main source of the Ca II H&K and H-alpha emission observed in HR 1099.

Although the Lyman-alpha profiles were too noisy in most cases to allow detection of multiple velocity components, a good correlation was found between the relative strength of the emission and orbital phase. Strongest emission was usually observed around phase (ORB) 0.35 while weakest emission was usually found near phase (ORB) 0.85. The phase of maximum emission intensity agrees well with that found for the minimum of the

photometric distortion wave (phase (ORB) 0.38) by Bopp et al. (1977). This result is in good agreement with similar emission-wave correlations found in other RS CVn binaries by Weiler (1975), Mulligan and Bopp (1975), and Bopp (1976).

Hall (1972) has hypothesized that similar photometric distortion waves in other RS CVn binaries are produced by starspot concentrations in preferred longitudes on the active star. This concept of preferred longitudes of activity has its solar precedent as reported by Bumba and Howard (1965) and Dodson and Hedeman (1968). The aforementioned correlations support Hall's model as the plage and flare activity necessary to produce chromospheric emission lines would likely be concentrated in similar longitudes. Extensive and variable chromospheric activity is also indicated by Owen's (1976) recent observations of solar-type radio emission from HR 1099.

Analysis of the current data is continuing and a more detailed report of this research and additional studies of UX Ari will appear elsewhere. This study was conducted as part of an international project aimed at monitoring chromospheric activity in HR 1099 and UX Ari. The project consisted of coordinated satellite UV spectrophotometry as well as radio, UVB photometry, H-alpha and Ca II H&K, and polarimetric observations. Analyses of the combined data set will begin shortly, and any reports of additional observations of these two systems during 1976 would be greatly appreciated.

The satellite research discussed in this note was supported by the National Aeronautics and Space Administration.

EDWARD J. WEILER
Princeton University Observatory
Peyton Hall
Princeton, New Jersey 08540

References:

- Bopp, B.W. 1976, I.B.V.S. 1175
- Bopp, B.W., Espenak, F., Hall, D.S., Landis, H.J., Lovell, L.P.,
and Reucroft, S. 1977, Astron. Jour., in press
- Bopp, B.W. and Fekel, F. 1976, Astron. Jour. 81, No. 9, 771
- Bumba, V. and Howard, R. 1965, Astrophys. Jour. 141, 1492
- Dodson, H.W. and Hedeman, E.R. 1968, IAU Symposium No.35,
Structure and Development of Solar Active Regions, 56
- Hall, D.S. 1972, Publ.Astron. Soc. Pac. 84, 323
- Mulligan, K. and Bopp, B.W. 1975, I.B.V.S. 1075
- Owen, F.N. 1976, IAU Circ. No. 2929
- Rogerson, J.B., Spitzer, L., Drake, J.F., Dressler, K.,
Jenkins, E.B., Morton, D.C., and York, D.G. 1973,
Astrophys. Jour. (letters), 181, L97
- Weiler, E.J. 1975, I.B.V.S. 1014