

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1352

Konkoly Observatory
Budapest
1977 October 19

HR 4665: A NEWER, BRIGHTER RS CVn BINARY

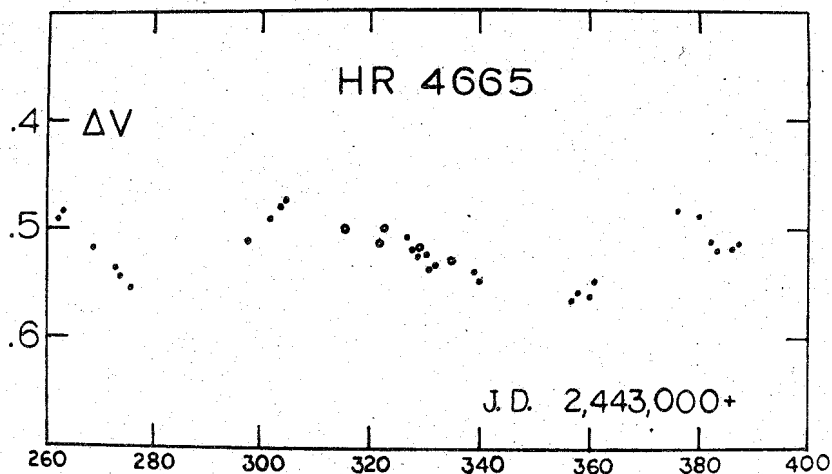
The recent discovery of the interesting characteristics of HR 1099 = V711 Tau (Bopp and Fekel, 1976; Bopp, Espenak, Hall, Landis, Lovell and Reucroft, 1977; Owen, 1976) has given observers a bright ($V \approx 5^m.8$) readily accessible RS CVn binary that can be studied in many different wavelength regions. To further aid satellite-UV observers, radio astronomers, and high dispersion spectroscopists, we have discovered a brighter RS CVn binary: HR 4665 ($V \approx 5^m.4$ according to the 1964 Yale Bright Star Catalogue).

HR 4665 is listed by Bidelman (1954) as a spectroscopic binary with CaII emission. Several spectra obtained by Young (1945) had indicated a velocity variation of ~ 30 km/sec. Spectroscopic observations by Doty (1975) with the 1-meter Ritter Observatory reflector revealed the Ca II H and K reversals to be exceptionally strong. In addition, his spectra (dispersion 30 \AA/mm) exhibited variable line widths suggesting a double-line spectroscopic binary. Subsequent coudé spectra (dispersion 8 \AA/mm) obtained at McDonald Observatory confirmed the suspected line doubling. On these high dispersion blue spectra the absorption lines of both components are narrow, with approximately equal intensity. Ca II emission is present in both components. The spectral types are near K0. A few observations of the red region obtained at Ritter show H α as a normal absorption feature. A spectroscopic orbit has not yet been determined, but an orbital period in the range 10^d to 20^d is suggested by the data.

Recent photoelectric photometry at two observatories has revealed the optical variability of HR 4665. Using the 60-cm Cassegrain reflector at Dyer Observatory, Henry obtained 90 dif-

differential V observations on 28 nights between JD 2,443,260 and 2,443,387. With his 20-cm Newtonian reflector Landis obtained 11 observations in the V on 5 nights from JD 2,443,316 to 2,443,335. All observations were made with respect to the comparison star HR 4659 and corrected for differential atmospheric extinction. Nightly extinction coefficients were used whenever possible because of the rather wide angular separation of the variable and the comparison (about 2°) and the large hour angles at which many of observations were made. In addition, the observations were transformed to V of the UBV system, but the corrections involved were very small since $\Delta(B-V)$ is only $-0^m.04$. As a check on the constancy of the comparison star, HR 4740 was observed differentially with respect to HR 4659 on 5 nights by Henry. The resulting mean difference was $\Delta V = 0^m.613$, with a standard deviation of $\pm 0^m.007$ for a single observation about that mean.

Nightly means of the differential magnitudes of Henry and Landis are plotted in the Figure as closed circles and open circles, respectively; Δ is in the sense variable minus comparison.



The uncertainties of these nightly means probably fall in the range ± 0.005 to ± 0.015 . Although there are gaps in the light curve, the simplest interpretation yields a photometric period in the range 60^d to 70^d and an amplitude from maximum to minimum of 0.08^m .

Since it seems that the photometric period and the spectroscopically determined orbital period are considerable different, HR 4665 resembles λ And (Landis, Lovell, Hall, and Henry, 1977) more so than it does HR 1099. In λ And the orbital period is 20.5^d and the photometric period is in the range 48^d to 57^d . If the orbital period of HR 4665 turns out to be greater than 14 days, it would not strictly be an RS CVn binary but would be a member of the long period group defined by Hall (1976).

We are preparing to obtain additional observations of HR 4665, both spectroscopic and photometric, as soon as it again becomes observable in the sky.

BERNARD W. BOPP
Ritter Observatory
University of Toledo
Toledo, Ohio 43606

FRANCIS FEKEL, Jr.
Department of Astronomy
University of Texas
Austin, Texas 78712

DOUGLAS S. HALL
GREGORY W. HENRY
Dyer Observatory
Vanderbilt University
Nashville, Tennessee 37235

HOWARD J. LANDIS
Landis Observatory
2395 Wood Hill Lane
East Point, Georgia 30344

References:

- Bidelman, W.P. 1954, *Astrophys.J.Suppl.* 1, 175
Bopp, B.W. and Fekel, F. 1976, *Astron.J.* 80, 771
Bopp, B.W., Espenak, F., Hall, D.S., Landis, H.J., Lovell, L.P., Reucroft, S. 1977, *Astron.J.* 82, 47
Doty, E. 1975, Master's Thesis, University of Toledo
Hall, D.S. 1976, *I.A.U. Colloq. No.29*, part I, 287
Landis, H.J., Lovell, L.P., Hall, D.S., Henry, G.W. 1977, *Bull.Am.Astron. Soc.* 9, 351
Owen, F.N. 1976, *I.A.U. Circ. No. 2929*
Young, R. 1945, *Pub. David Dunlap Obs.* 1, 1