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A Probable RV Tauri Star Near HR Del

The Indiana University 16-inch automated CCD photometric telescope (Honeycutt et al., 1989; 1990; 1992) acquires about 100 exposures each clear night, mostly on a program involving nightly monitoring of nova-like and SU UMa CV's. The photometric reduction technique used for ensemble photometry on inhomogeneous data sets (Honeycutt, 1992) provides, as a by-product, the light curve of all stars in the field. Consequently, the program is discovering a number of new variable stars, one of which is described here.

A computer-generated finding chart for the new variable is shown in Figure 1. A photographic finding chart of this same field can be found in Duerbeck (1987). The coordinates of the variable are 20:42:12, +19:09:22 (2000.0), with an accuracy of about 5 arc-seconds.

The light curve in Figure 2 shows variations of about one magnitude with a complicated behavior. As described in Honeycutt (1992), the error bars correctly represent the uncertainty of the differential photometry, but the zeropoint of the magnitude scale has an uncertainty of about ± 0.2 mag. The portion of the light curve beyond JD = 2448700 is quite sinusoidal with a best fit

$$V = V_o + A*\sin(2\pi*(JD-JD_o)/P)$$

where V_o = 14.7 (± 0.02) mag (± 0.2 mag including zeropoint error),
A = 0.5 (± 0.02) mag,
JD_o = 2448778 (± 1) days,
P = 97 (± 1) days.

This sine wave also fits some of the data before JD = 2448700, but data near JD = 2448450 are discrepant.

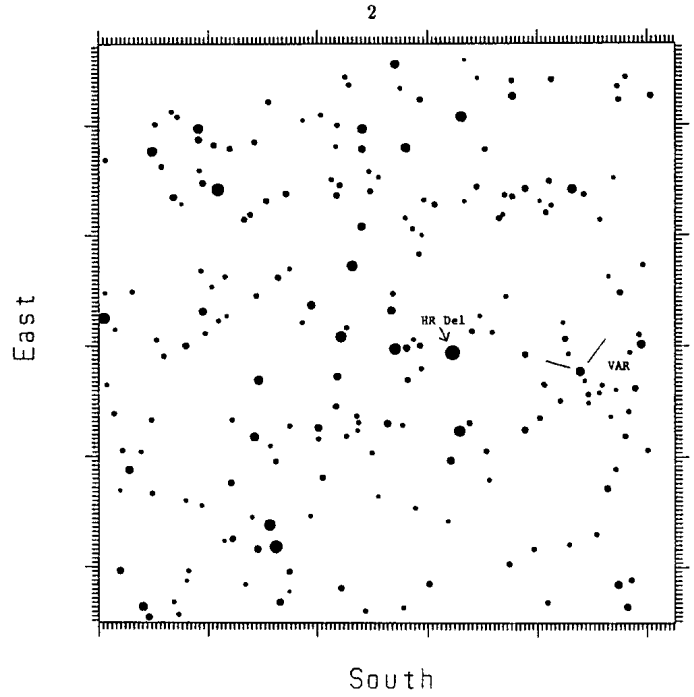

Figure 1: Finding chart with HR Del and the new variable marked. The field is 7.2 arc-minutes on a side.

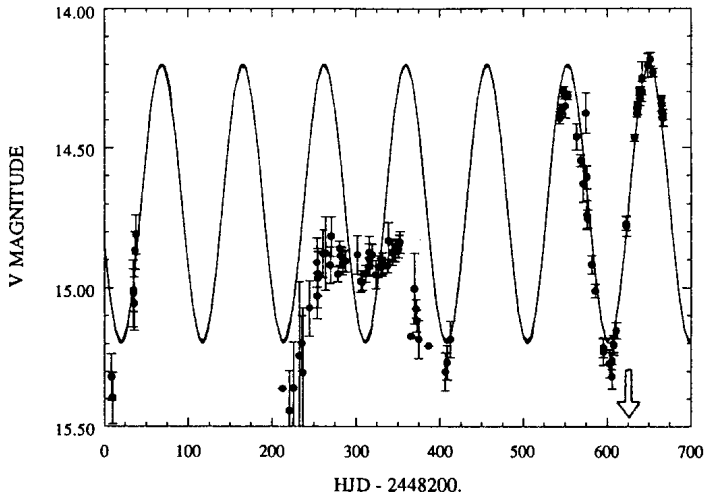

Figure 2: V-band CCD photometry of the new variable in the years 1990-1992 with a sine curve fit. The arrow marks the time of the spectrum in Figure 3.

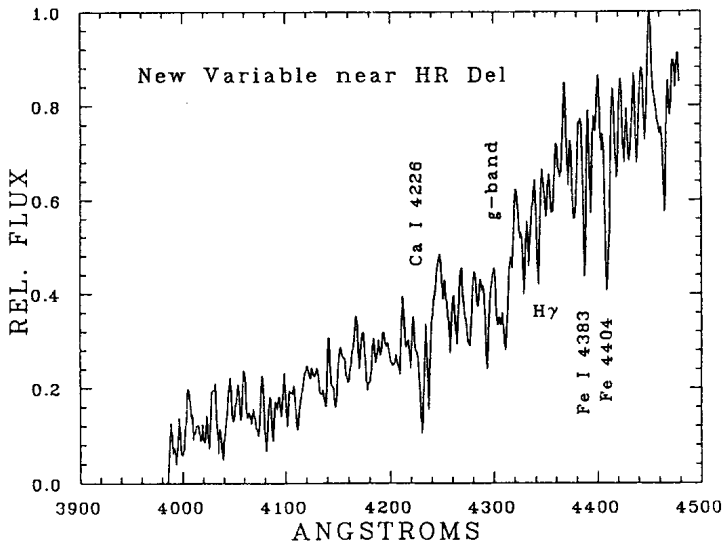

Figure 3: A blue spectrum of the new variable.

Figure 3 is a blue spectrum of the new variable obtained on August 22(UT), 1992 with the Ohio State CCD spectrograph on the Perkins 1.8-meter telescope of the Ohio Wesleyan and Ohio State Universities at the Lowell Observatory. The resolution is 2.5 Angstroms. The spectrum was obtained through clouds and the S/N is consequently poor. Nevertheless, enough features are visible to conclusively identify the spectral type as K. The arrow in Figure 2 marks the date when the spectrum was obtained.

The photometry and spectroscopy are consistent with this star being an intrinsic variable of the RV Tauri type (Rosino, 1951; Joy, 1952; Preston et al., 1963). These stars have periods of 50-150 days, are of spectral type F,G or K, and usually display alternating deep and shallow minima and/or erratic light curve variations. The complicated light curves likely arise from more than one atmospheric layer in motion, with accompanying interactions and shocks (Baird, 1982; Wallerstein and Elgar, 1992).

HR Del will remain on our observing program, so we expect light curve points on this new variable will continue to accumulate.

R.K. Honeycutt, J.W. Robertson,
D.N. Vesper, B.D.Kern, G.W. Turner

Indiana University
Astronomy Department
Swain Hall West
Bloomington, IN 47405
USA

J.R. Pier*

U.S. Naval Observatory
Flagstaff Station
P.O. Box 1149
Flagstaff, AZ 86002-1149
USA

*Visiting Observer, Lowell Observatory, Flagstaff, Arizona

References:

Baird, S.R.: 1982, Pub. A.S.P., 94, 850

Duerbeck, H.W.: 1987, Sp. Sci. Rev., 45, 1

Honeycutt, R.K.: 1992, Pub. A.S.P., 104, 435

Honeycutt, R.K., Adams, B., Grabbhorn, R., Turner, G., White, J., and Vesper, D.:1989, in Remote Access Automatic Telescopes, eds. D.S. Hayes and R.M. Genet (Mesa, Fairborn), p. 105

Honeycutt, R.K., Vesper, D., Turner, G.W. and Adams, B.: 1990, in CCD's in Astronomy II: New Methods and Applications of CCD Technology, eds. A.G.D. Philip, D.S. Hayes and S.J. Adelman (Schenectady, L. Davis), p. 177

Honeycutt, R.K. and Turner, G.W.: 1992, to appear in Robotic Telescopes in the 1990's, ed. A. Filippenko (San Francisco, ASP)

Joy, A.: 1952, Ap. J., 115, 25

Preston, G.W., Krzeminski, W., Smak, J. and Williams, J.A.: 1963, Ap. J., 137, 401

Rosino, L.: 1951, Ap. J., 113, 60

Wallerstein, G. and Elgar, S.: 1992, Science, 256, 1531