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HD174853 - A NEW ECLIPSING BINARY

HD174853 = HR7109 was found to be a spectroscopic binary by one of us (Hube, 1970) who noted spectral line doubling on one of eleven low dispersion plates. The star has also long been suspected as a photometric variable (Hoffleit, 1964). In this note we briefly describe recent observations which confirm that HD174853 is a double-lined spectroscopic binary, and that the suspected photometric variations are real and due to two nearly-equal eclipses in each short period orbital cycle.

Spectroscopic observations have been made intermittently during the past fifteen years at the Dominion Astrophysical Observatory, Victoria, using the Cassegrain spectrograph on the 1.88-m telescope at a dispersion of 1.5 nm mm^{-1}. Due to very severe blending of the rotationally broadened lines of the two components very little progress has been made. Even using an oscilloscopic-setting comparator it was never possible to confidently and unambiguously resolve the lines and measure the radial velocities of each component.

Recently, we have scanned most of the spectrograms on a PDS microdensitometer and reduced the data using the cross-correlation procedures developed at the DAO (Hill, 1982) and which are proving invaluable in resolving secondary spectroscopic components (c.f. Gulliver, et al, 1985). Spectroscopically, the two components are quite similar though

sufficiently different to permit one to distinguish the primary from the secondary in the cross-correlation functions. The semi-amplitude of the velocity variation of each component is approximately 170 km s^{-1}. Over a time interval as short as 2 hours on a given night the radial velocities changed markedly, suggesting a very short orbital period and the possibility that the previously detected photometric variations are due to eclipses.

Using a 0.45-m telescope and a 1P21 PMT-equipped single channel photometer built by one of us (A.M.), HD174853 was observed on twelve nights between May and December 1985. HD175592 was the comparison star and HD176232 (see following note) served as a rough check star. Corrections were made for differential extinction. A total of approximately 200 observations was obtained with a V filter.

We find that HD174853 is, indeed, an eclipsing binary with two nearly-equal minima occurring in an orbital period of approximately 1.3907 days. The observations are plotted with this period in Figure 1 where phases are measured from JD(⊙) = 2446201.161. There is substantial uncertainty in both the orbital period and epoch of primary minimum due to the paucity of data. Due to an unfortunate distribution of clear nights almost an entire half-cycle has gone unobserved. In addition, what we take to be the secondary minimum was observed on only one night, and sky conditions were deteriorating rapidly toward the end.

Cowley, et al. (1969) classified the star as B8Vnn and list colour indices which imply reddening of at most a few

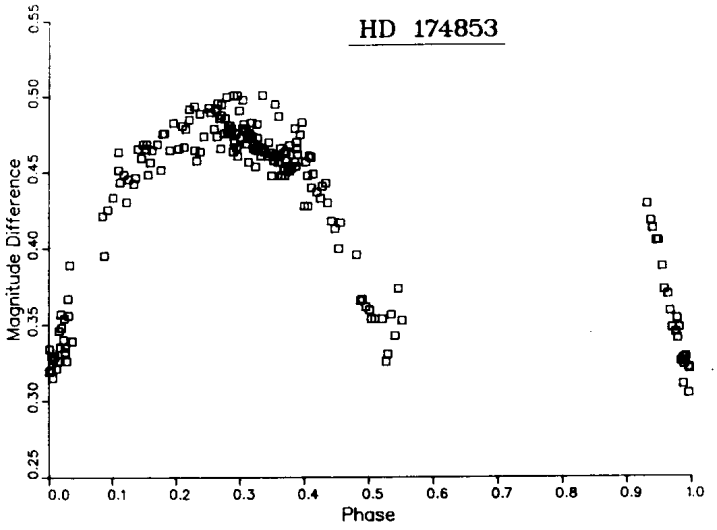

Figure 1

hundredths of a magnitude. The photometry of Crawford, et al. (1973) is also consistent with a very small amount of reddening. The measured β-index implies an absolute magnitude of approximately +0.3 (Crawford, 1978) which is appropriate for a normal B8 dwarf (Allen, 1973; Underhill and Doazan, 1982). In the β-c_1 diagram HD174853 is close to the zero-age main sequence.

In summary, HD174853 appears to be a relatively young, contact or near-contact binary with similar components.

We plan to obtain a complete light curve during the next observing season. The spectroscopic observing and analysis are being done in collaboration with Graham Hill and Wes Fisher,

Dominion Astrophysical Observatory, from whom we have obtained the benefit of preliminary discussions on this system. A complete discussion and analysis of all the data will be presented elsewhere.

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