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SHORT-PERIOD VARIABILITY OF
THE BINARY STAR HD 206631

During observations of the eclipsing binary EK Cephei on a very photometric night at the Blue Mountain Observatory of the University of Montana on October 6-7, 1980 one of the comparison stars exhibited abnormal fluctuations in its brightness. Its behavior resembles that of a Delta Scuti-type variable not previously reported, with an amplitude of about 0.03 mag and a period of about 25 minutes as shown in Figure 1.

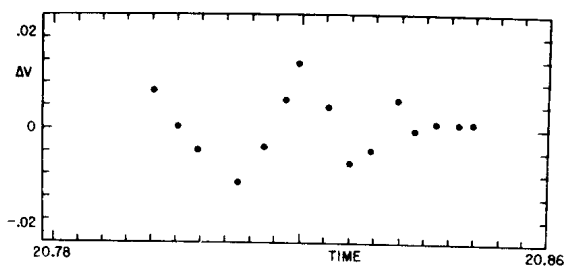


Figure 1. Photoelectric photometry of HD 206631 in 1980. The ordinate is in magnitudes. To convert the time shown to Hel. JD, add 2,444,500.0.

The characteristics of this star [HD 206631=BD+67°1343=SAO 19573=ADS 15225, $\alpha=21^{\text{h}}39^{\text{m}}21^{\text{s}}$, $\delta=+68^{\circ}09^{\text{m}}$ (1950)] as given in the Star Atlas of Reference Stars and Nonstellar Objects (SAO, 1969) are as follows: spectral type, A0, and photographic and visual magnitudes of 8.9 and 8.3, respectively.

A 40 cm f/18 Cassegrain telescope with an EMI 6256B photomultiplier and a Corning 3384 filter that reproduces Johnson's V filter were utilized.

The comparison stars used were +68°1239 (8.8 mag, G0) and +67°1362 (7.9 mag, K2). During these observations the dispersion in the magnitude difference $C_1 - C_2$ was 0.0027 mag., whereas the amplitude of the variable was about 0.03 mag. A single observational sequence of the two comparison stars and the variable at the Blue Mountain Observatory takes about 1.5 min., but in order to make the data homogeneous with that obtained at the Observatorio Astronómico Nacional, México, averaging of all data points lying within a five-minute time span was performed.

Dr. T. E. Margrave encouraged the Mexican group studying variable stars at the Instituto de Astronomía, University of Mexico, to verify his discovery. However, the mounting of the two telescopes available at that time did not permit observation of stars north of declination 62°, so this request was not fulfilled until the two-meter telescope at the San Pedro Mártir Observatory was utilized. These observations were carried out on the nights of August 9 and 11, 1982. The Johnson V filter and a 1P21 cooled photomultiplier were used. The standard stars used during the two nights of observations were BD+67°1362 and BD+67°1332, one of which was utilized previously at Montana. However, a different comparison star than +68°1239 was necessary, since its declination made its observation with the two-meter telescope impossible. Therefore BD+67°1332 was utilized instead. Its spectral type is A0, and its visual magnitude is 8.6. These two stars satisfy very well the requirements for comparison stars as reported by Warman et al. (1974).

The light curves obtained on these last two nights are presented in Figure 2. Each point represents the average of six ten-second integrations of the star (V) and one ten-second integration of the sky (S), which was subtracted from the average. The magnitude was then

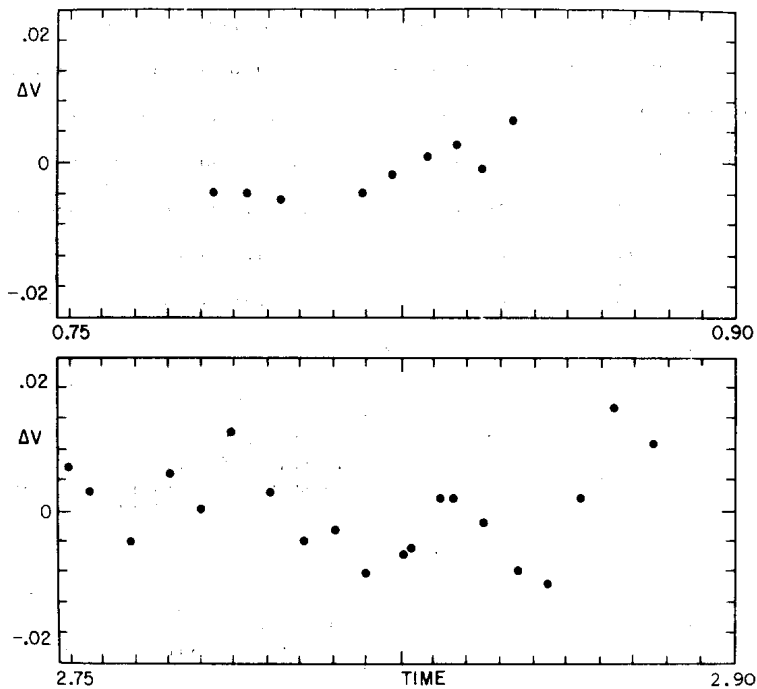


Figure 2. Photoelectric photometry of HD 206631 in 1982. The ordinate is in magnitudes. To convert the times shown to Hel. JD, add 2,445,190.0.

obtained by means of the well-known relation $m = -2.5 \log (\bar{V}-S)$. The differences between the magnitude of the variable and the averages of the two comparison stars were calculated for each time at which the variable was observed. The precision of each point is 0.004 mag. in brightness and 0.0035 day in time. The standard deviation of the difference between the two comparison stars is 0.005 mag., far less than the 0.03 mag. of the variable's amplitude.

Due to the fact that this star has spectral type A0, a period on the order of an hour, and an amplitude of variation of 0.03 mag. one can conclude that it is almost certainly a Delta Scuti variable. Thus

HD 206631 would be one of the fastest Delta Scuti pulsators, having a period comparable to that of the cluster star variables (Breger, 1979).

It should be emphasized that HD 206631 is also a binary star. According to Jeffers et al. (ADS, 1963), it was first reported by W. T. Hussey in 1904 as having a separation of 1.2 arc sec and magnitudes for the components of 8.8 and 10.3 mag. The photometric data will be submitted to the IAU Archives (M. Breger, University of Texas-Austin). Further cooperative research on this star is planned.

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References:

- Breger, M. 1979, Publ. Astron. Soc. Pac., 91, 5.
- Jeffers, H. M., Van den Bos, W. H., and Greeby, F. M. 1963, Pub. L. O.f,
Vol. XXI (Index Catalogue of Visual Double Stars, 1961.0).
- Staff of Smithsonian Astrophysical Observatory. 1969, Star Atlas of
Reference Stars and Non-Stellar Objects, The MIT Press.
- Warman, J., Malacara, Z., and Breger, M. 1974, Rev. Mex. Astr. y Astrof.,
1, 143.