

COMMISSION 27 OF THE I. A. U.
 INFORMATION BULLETIN ON VARIABLE STARS
 Number 3334

Konkoly Observatory
 Budapest
 2 June 1989
 HU ISSN 0374 - 0676

HD 147 491 - A NEW DELTA SCUTI VARIABLE STAR

HD147491 = G289 (Greenstein 1939) = L2202 (Lee 1977), a field star in the direction of the globular cluster M4, was measured photoelectrically as a secondary standard star by Lee (1977). The magnitude and colors of this star given by him are $V=9.612$, $B-V=0.610$, $U-B=0.064$ ($n=6$). Cacciari (1979) gave its $V=9.679$, $B-V=0.627$. While extending photoelectric BVRI standard sequence of eleven stars in the field of M4, Clementini found that for this star $V=9.525$, so the disagreement got by him with the previous values was quite large and the scatter among the individual measurements of this star was quite large too (± 0.024). He suggested that the star is "likely to be a variable star" (Clementini 1987).

Actually, this star is a Delta Scuti variable star indeed. Its variability was found by us as a by-product when it was used as one of comparison stars to calibrate our new variable stars in M4 in 1979. Our formal photoelectric data were obtained with the conventional photoelectric photometer attached to the 60cm reflector at the Beijing Observatory. The photomultiplier EMI6256 plus d.c. amplifier plus strip recorder was used on July 13, 1980. G544 (Alcaino 1975) ($V=10.39$, $B-V=0.86$) was the comparison star to get the difference G544-G289 through the V filter. The integration time was 10 seconds. Because the declination of the variable star is about -26.3° and the latitude of the Beijing Observatory is about $+40^\circ$, the zenith distance of the star is always as large as or larger than 66.3° , the seeing was large so we had to use a 37" diaphragm and accounted for the differential extinction even between

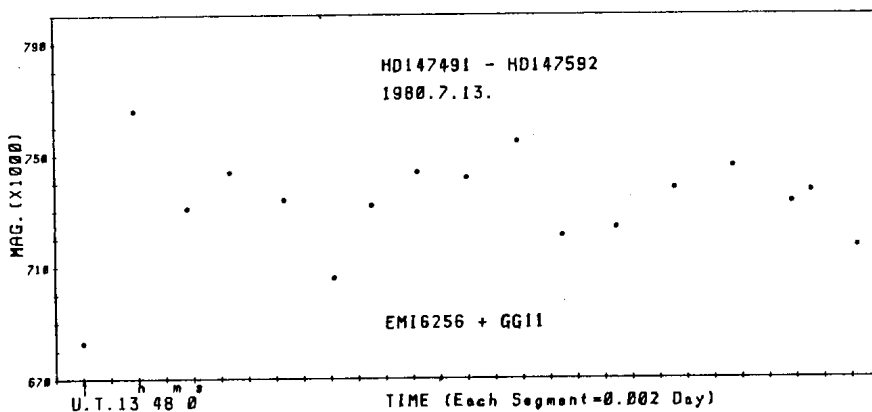


Figure 1

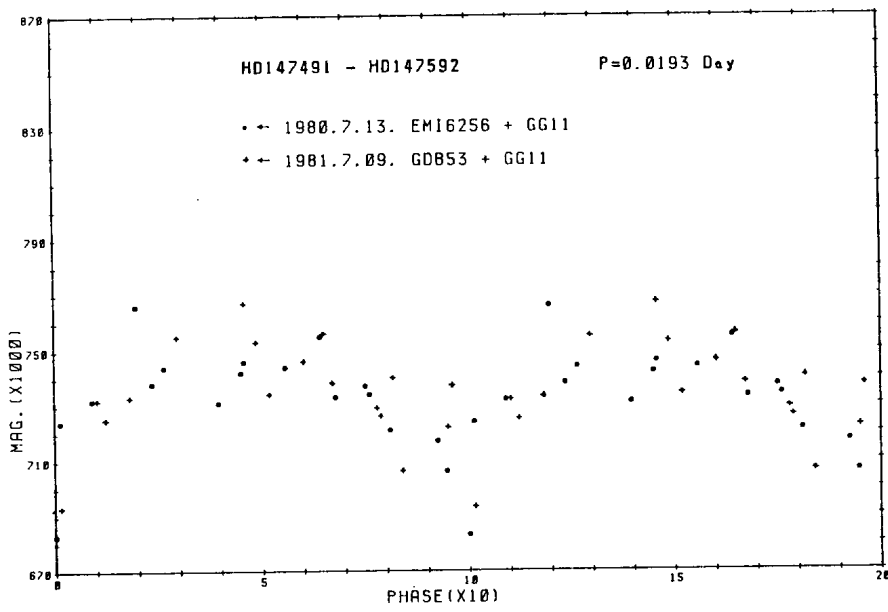


Figure 2

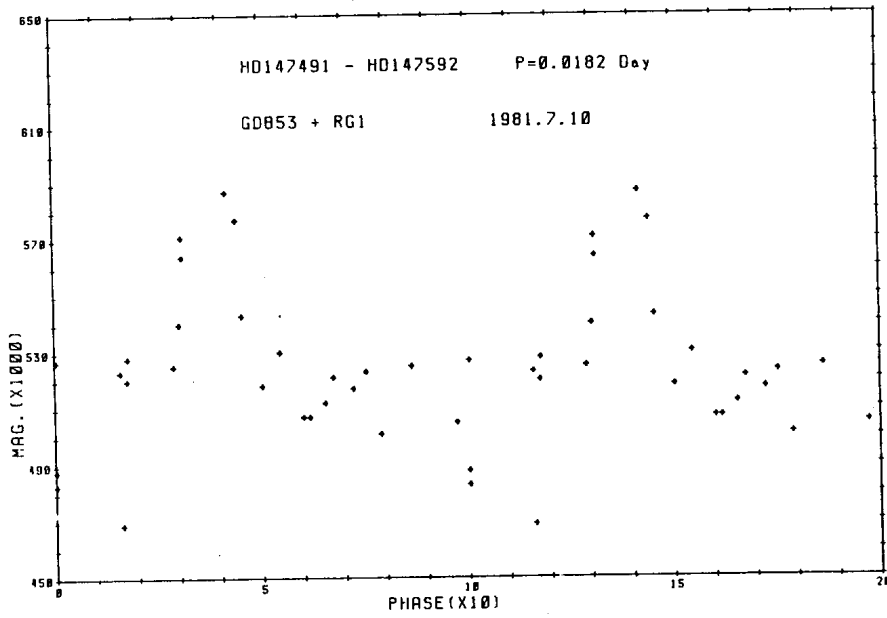


Figure 3

G544 and G289. However, from the observations a period around 25 minutes became readily apparent (Fig.1). The star was measured again on 1981 July 9, with a photomultiplier GDB53 (Sb-K-Cs cathode) plus photon counting system in V, at this time the star HD147592 (Lee 1977) ($V=8.930$, $B-V=0.310$) was used as the comparison star. We combined the data of these two nights by adding a zero point correction to the data of one night and a period of about 0.0193 day was derived using the L-K method. The light curve is given in Fig.2.

The interstellar reddening $E_{(B-V)}$ determined from the field stars in the direction of M4 by Alcaino and Liller (1984) was used to estimate the intrinsic colors of G289 to be $(B-V)_0=0.18$, $(U-B)_0=-0.26$, suggesting a spectral type of A6 instead of G0 given in the HD catalogue if it is a Pop I dwarf star. However, the $(U-B)_0$ is too blue.

In order to reduce the influence of differential extinction the star was observed once again on 1981 July 10 using the same equipment as that on 1981 July 9 but through the red filter RG1 instead of GG11. Because the wavelength range of the spectral response of GDB53 is about 3100-6200 Å, so the combination was somewhat similar to narrow-band photometry. Unfortunately, the star is not bright enough to give high signal to noise ratio. The light curve so calculated with a period 0.0182 day is shown in Fig.3. It is understandable that the scatter here is much larger than that in Fig.2.

Many Delta Scuti stars change the shape of their light curves from time to time and have multiple periods. For our accuracy it is not sure whether the period of this star is constant or not, or there are any other periods.

We attempted to observe this star at the Yunnan Observatory ($\phi=25^\circ$) but failed to do so due to bad weather and the limited observing time we were allocated. Now that this star is most suitable to be measured by southern hemisphere observers, we decided to stop observing it and publish the preliminary results only which may be useful for others.

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