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FLARE ACTIVITY OF HD 282773 (G5)

HD 282773 (reference star) and HD 282633 (check star) were used as comparison stars in observations of SU Aur over the period from 1981 to 1982. The magnitude differences of these stars have been obtained using a 20" reflector with UBVR counting photometer during 28 nights on the Peak Terskol. The average standard deviations of individual UBVR differences are:

$\sigma_U = 0^m.026$, $\sigma_B = 0^m.018$, $\sigma_V = 0^m.017$, $\sigma_R = 0^m.016$.

During the 2-year period of observations the stars seemed to be fairly constant, but continuous photoelectric monitoring of HD 282773 on 10 October 1981 revealed a flare similar to those of UV Ceti variables. Figure 1 shows

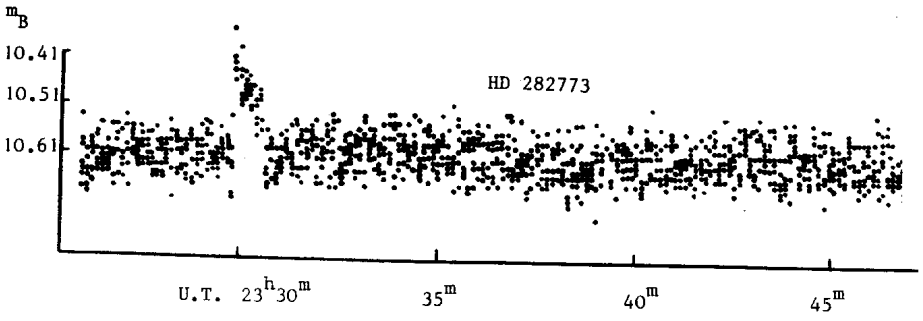

Figure 1

the light curve obtained during 20-minute monitoring in B filter. The integration time was $1^s.0$. The amplitude of the flare was $0^m.25$, the duration was about 1 minute.

On the following night additional observations were made with the same technique but no noticeable variability was recorded.

Since this star belongs to the G5 spectral class the energy parameter of the observed flare is of great interest. In accordance with our measurements the V magnitude and colours of the variable are:

$$V = 9^m.723 \pm 0^m.006,$$
$$B - V = 0^m.887 \pm 0^m.009,$$
$$U - B = 0^m.557 \pm 0^m.010,$$
$$V - R = 0^m.724 \pm 0^m.008.$$

The known spectral class and colour-indices make it approximately possible to establish a luminosity class and to estimate the flare energy. The colour excess of HD 282773 is between $E_{B-V} = 0^m.13$ (if the star is a giant) and $E_{B-V} = 0^m.25$ (if the star is a dwarf). The self-consistent solution of the equation

$$m - M = 5 \lg r - 5 + 3.2\, E_{B-V}$$

gives:

$$M_V = 3^m.1, \qquad E_{B-V} = 0^m.19, \qquad r = 158 \text{ pc}$$

The obtained distance r and colour-excess E_{B-V} well agree with the interstellar extinction in the direction of the star (Neckel, 1967).

The energy distribution in the spectrum of the star has been assumed to be a black-body with a temperature $T_e = 5300$ K. Thus, we can estimate a part of energy α_B radiated by the star in the B-band of our photometric system:

$$\alpha_B = \frac{\int_0^\infty F_\lambda \cdot T_\lambda \cdot d\lambda}{\int_0^\infty F_\lambda \cdot d\lambda}$$

where: F_λ is the Planck's function,

T_λ is the relative response function of the B bandpass.

In this case, $\alpha_B = 0.075$.

As the absolute magnitude is $M_V = 3^m.1$, the total luminosity of the star is

$$L_* = 4.9 L_\odot = 1.9 \cdot 10^{34} \text{ erg sec}^{-1}.$$

Hence, the energy radiated by the star in the B band is equal to

$$L_B = 1.4 \cdot 10^{33} \text{ erg sec}^{-1}.$$

and the energy of the flare shown in Figure 1 is:

$$E_B = 7.6 \cdot 10^{33} \text{ ergs}.$$

Then the total optical energy of the flare is estimated as:

$$E_{opt.} \geq 10^{34} \text{ ergs}.$$

Neither possible error in M_V nor 10% - 20% additional energy from emission

lines (Moffet, Bopp, 1976) can essentially decrease the order of the value $E_{opt.}$. Hence the recorded flare is one of the most powerful in the flare stars.

If the flare activity of the HD 282773 obeys the statistical relationship between frequency and energy of individual flares (Gershberg, 1978), the star must show flares with smaller amplitudes, the mean frequency of flares increasing with the decrease of their energy. From that it follows that small optical flares ($0^m.01 - 0^m.001$) could be a cause of the potential microvariability of the star.

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