THE SPECTRUM OF HD 51585 IN THE BLUE AND IN THE ULTRAVIOLET (1) (2)

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ABSTRACT

New visible and ultraviolet spectra of the peculiar emission line star HD 51585 are described. Interstellar lines and the λ 2200 feature are rather weak. A colour excess E(B-V) = 0.33 is derived. The extinction curve resembles the one obtained from LMC stars.

HD 51585, mentioned by Merrill and Burwell (1933) as a P Cygni star has been studied spectroscopically by Andrillat and Houziaux (1969, 1973), and at a higher dispersion by Klutz and Swings (1977).

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(1) Les observations utilisées dans le présent travail ont été effectuées partiellement à l'Observatoire de Haute Provence (C.N.R.S.).

(2) Based on observations by the I.U.E. collected at the Villafranca Satellite Tracking Station of the European Space Agency.

M. Jaschek and H.-G. Groth (eds.), Be Stars, 427–430.

A new spectrum has been obtained on Jan. 2, 1981, using an RCA 3 stages image-tube spectrograph attached at the Cassegrain focus of the 193 cm telescope at the Observatoire de Haute-Provence. The region from Hβ to about 5000 A is covered with a reciprocal dispersion of 80 $A.mm^{-1}$. The spectrum does not differ from the description given by two of us in 1973. Nebular lines due to [O III] and [S II] appear in the observed region where all the lines are seen in emission and due to Fe II (multiplets 42, 43, 37, 38 and 27), to [Fe II] (multiplets 4F, 6F, 7F, 11F, 20F, 21F, 23F), N II (multiplets 11, 55, 61), He I (multiplets 12, 14, 16, 18, 51, 53). Hydrogen lines Hβ to Hε are seen as strong single emissions.

I.U.E. spectra in the low resolution mode have been obtained in March 1979 and May 1980. Like in the blue, the spectrum is dominated by strong emissions, several of which are also seen in planetary nebulae. O I λ 1302 is a strong emission, as it is also the case for Mg II around 2800 A. Stellar emission features include [N IV] λ 1483, C IV λ 1548 which shows a double emission with a moderate absorption, He II λ 1640 (?), [O III] at λ 1666, [N III] at λ 1760, an emission at λ 1888, which might be due to Fe II, the [C III] line at λ 1909, a strong unidentified emission appears at 2191 A. There might also be weak emissions between λ 2320 and λ 3000 due to Fe II, but identifications are uncertain. S II is present at 2849 A, while two features at λλ 3174 and 3187 may be attributed respectively to Mg II and He I.

Weak but definite interstellar features appear in the spectrum, notably S II (1235 A), Si II (1262 A), C II (1335 A), Si II (1527 A) and Al II (1668 A). The λ 2200 feature is weak but present. This may seem abnormal for a 11.5 magnitude star but this region in Monoceros has been found relatively free of interstellar absorption. From UBV measurements, two of us had deduced a color excess E(B-V) = 0.68. Continuum colors lead to a spectral type around B1. From measurements on the S2/68 spectra, we know that

$$\frac{E(2200-2740)}{E(B-V)} = 3$$

From the intrinsic color for a B1 star, we then deduce a value of 0.33 for E(B-V), showing that the visible colors are contaminated reemission in the Paschen continuum. The object is also known for exhibiting a strong infrared excess (Allen, 1973) which affects the V_0 magnitude of the star. The continuum energy distribution has been dereddened according to the $A_\lambda/E(B-V)$ curve by Nandy et al.(1976), with E(B-V) = 0.33. Then $(m_\lambda-V)_o$ has been plotted over λ. It is found that no model atmosphere fits the energy distribution curve over the entire range. A 25,000°K, log g = 4 cgs model gives nevertheless a good agreement in the λλ 2000-2500 region. If this model is forced to represent the continuous energy distribution of the star in the region λ 1200 - λ 2000, we have to adopt another reddening curve with a larger absorption below 2000 A. Such a curve is not unlike the one found for several LMC stars observed with I.U.E. (Nandy et al., 1980).

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DISCUSSION FOLLOWING ZOREC

Paterson-Beekmans: In our paper (Beekmans and Hubert-Delplace, A&A, 1980) we have also investigated the behaviour of Be and shell stars concerning the slope of their UV energy distribution and found essentially the same results as you. The stars having a bluer energy distribution as normal stars have a strong metallic shell in the visible region at the time of the observations.

Sonneborn: Among the normal B stars you have considered, are there many with large v sin i's?

Zorec: Not higher than 200 km/s, if I remember well.

DISCUSSION FOLLOWING VIOTTI

Thomas: I support your structure of atmospheric regions, and your idea to classify data according to which region they give information on, but please add a "region of deceleration" just near or before the "accretion" region.

DISCUSSION FOLLOWING HOUZIAUX

Selvelli: 1. The unidentified 2191 emission is a constant feature present in all the IUE low resolution LWR spectra. It is a spurious "emission" feature due to the constant presence of a saturated pixel. 2. The emission at ≈1890 A is unlikely to be Fe II because the other strong Fe II emissions are not present. It is more likely to be [Si III] 1890 that is usually present together with [C III] 1908 in many nebular spectra.

https://doi.org/10.1017/S007418090003816X Published online by Cambridge University Press