

ABSOLUTE MAGNITUDE DETERMINATION OF Be STARS: THE INADEQUACY OF THE 2200 Å BUMP

V. DOAZAN

Observatoire de Paris, 61, Av. de l'Observatoire, 75014 Paris, France

A. DE LA FUENTE

INTA-VILSPA, Apartado 50727, 28080 Madrid, Spain

M. BARYLAK

ESA IUE Observatory, Apartado 50727, 28080 Madrid, Spain

N. CRAMER

Observatoire de Geneve, CH-1290 Sauverny, Suisse

ABSTRACT We present far UV observations of Pleione made with the IUE satellite at two epochs: in 1979, when the star exhibited a strong shell spectrum and, in 1991, when it showed a Be-type spectrum. Between these two epochs, the 2200 Å bump changed dramatically, thus, rendering it inadequate for interstellar extinction/distance determination.

INTRODUCTION

Pleione (BU Tau, 28 Tau, HD 23862, B8Ve, $v_{\text{ini}} = 320 \text{ km s}^{-1}$) is the only Be star which has been observed in both the Be-shell and the Be phases in the far UV. These unique observations gave us the opportunity to test the validity of the methods which use the 2200 Å bump to determine the interstellar extinction/distance of Be stars.

OBSERVATIONS

The study of low (6 Å) and high resolution (0.2 Å) spectra of Pleione obtained with the International Ultraviolet Explorer (IUE) during the strong Be-shell phase of 1979 and the well-developed Be phase of 1991 shows that :

1. the 2200 Å bump varies dramatically
2. the far UV radiative energy flux increases considerably between the Be-shell and the Be phases in the 1250-3000 Å wavelength range, (see Doazan et al., 1991)
3. the slope of the far UV continuum changes strongly.

Fig. 1

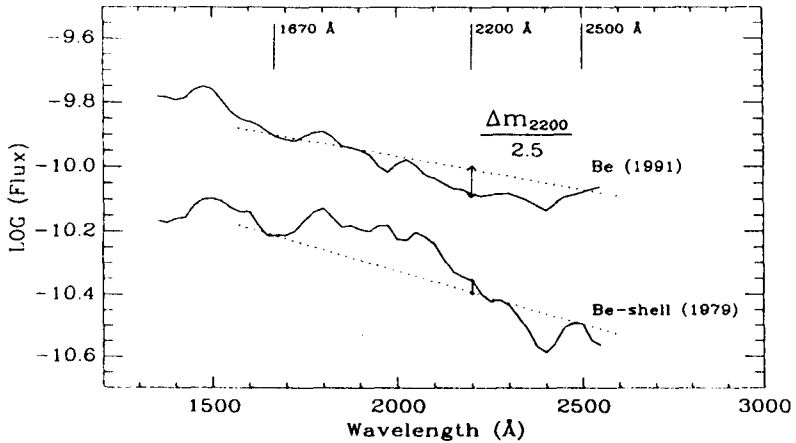


Fig. 1 presents the spectral region of Pleione used for determining the interstellar extinction of Be stars from the observed 2200 Å bump. It is plotted at the two epochs: strong Be-shell (Jan. 2, 1979: SWP3780 & LWR3341) and well-developed Be phase (Aug. 21, 1991: SWP42302 & LWP21051). Note the large increase in absolute flux between these two epochs (no offset is applied).

We see immediately that the *pattern of the 2200 Å spectral region has completely changed between these two phases*. Moreover, the bump is in absorption in the Be phase, but it appears in weak emission in the Be-shell phase. The study of the high resolution far UV spectra of Pleione obtained at the same epochs shows that the entire spectral region (1550-2550 Å) used in the determination of the 2200 Å bump is crowded by shell absorption lines during the Be-shell phase. We identified more than 1300 lines in this bump. By contrast, during the Be phase very few spectral lines are observed in that region.

CONCLUSION

The above far UV observations of Pleione lead to the two unavoidable conclusions:

1. the 2200 Å bump cannot be used reliably for the determination of the interstellar extinction/distance of Be stars - as was done in several far UV surveys
2. any absolute magnitude determination of Be stars must be based on observations made in the broadest possible spectral range and must necessarily include the far UV spectral region, where most of the variable radiative energy flux is emitted.

REFERENCES

Doazan, V., Sedmak, G., Barylak, M., Rusconi, L.: 1991, *A Be star Atlas of far UV and optical high resolution spectra*, ESA SP-1147