B[e]-STARS OF THE MAGELLANIC CLOUDS

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We carried out a spectroscopic and photometric study of the 8 presently known B[e]-stars of the Magellanic Clouds (MC), i. e. R4 and R50 of the SMC, R66, R82, R126, Hen S12, Hen S22 and Hen S134 of the LMC. These stars are characterized by the following typical properties: a) strong Balmer emission lines, frequently with P Cygni profiles, b) permitted and forbidden emission lines predominantly of Fe II, [Fe II], [O I] etc., c) strong IR excess due to circumstellar dust. Photospheric absorption lines are usually weak or even not detectable.

In a (J-H)-(H-K)-diagram of MC emission line stars the B[e]-stars form a clearly separated group with H-K > 0.8. The spectral energy distribution from the UV to the IR (Fig. 1) can be interpreted as the sum of radiation from a hot stellar core (visible mainly in the UV), of a contribution of (f-f)-(f-b)-radiation of ionized hydrogen in the visual and near infrared and of thermal radiation of circumstellar dust at about 5 μm with a temperature of about 900 to 1200 K. The discussion of the line spectrum of R126 resulted in a two-component model for the stellar wind which is schematically shown in Fig. 2 (Zickgraf et al. 1985). Stellar rotation is thought to bring the stars close to the break-up-velocity leading to the formation of a dense, cool equatorial disk. R126, Hen S134 and probably Hen S22 present the pole-on case. R50, R82 and presumably R4 are examples for the equator-on case. Particularly R50 and R4 are characterized by sharp shell type absorption lines of Ti II and Cr II, which are typical for classical shell stars.

The remaining two stars Hen S12 and R66 seem to form an own group among the B[e]-stars. The Balmer line P Cygni profiles of Hen S12 show a knee-like transition between absorption and emission component, similar to the profiles of R66. For this particular star Stahl et al. (1983) derived a model with a gravitationally decelerated stellar wind.

Fig. 3 shows the HR-diagram of the B[e]-stars. We con-

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clude that the B[e]-stars are evolved massive post-main-sequence stars. Massive premain-sequence stars are supposed to be only visible as IR-sources. Six objects can be explained by a model with a disk-like structure observed under different inclination angles. Two stars might represent the case of a gravitationally decelerated stellar wind.

A more detailed paper will appear in Astronomy and Astrophysics.

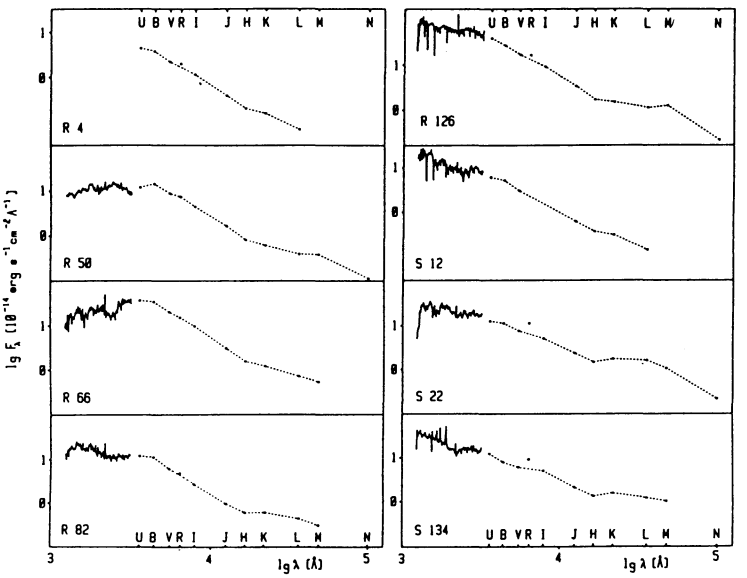

Fig. 1: Spectral energy distributions from the UV to the IR. Note the IR excess with colour temperatures between 900 and 1200 K.

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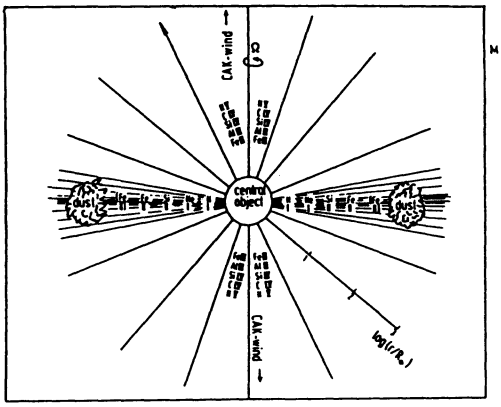

Fig. 2: Proposed schematic model of the two-component stellar wind. Emission-lines and dust are formed in the equatorial disk, broad UV-resonance absorption lines originate in the line-driven wind in the polar region.

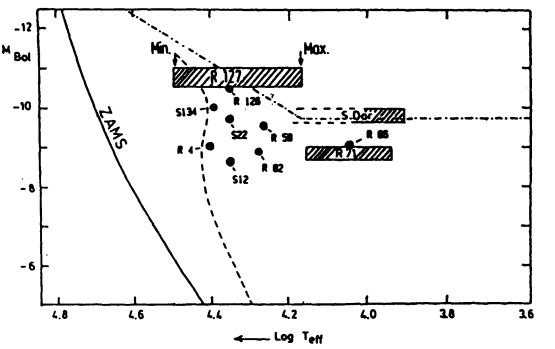

Fig. 3: HR-diagram of the B[e]-stars in the MC (dots) together with the three known S Dor variables of the LMC. All B[e]-stars are situated to the right of the main-sequence band.

References:

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