PHOTOMETRIC CHARACTERISTICS OF THE Be STARS: ALMOST TWENTY YEARS OF UBV MONITORING AT THE HVAR OBSERVATORY

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1. The scope of the observational project

Since their discovery (by Father Secchi in 1866) until the end of sixties, Be stars were not a subject of any systematic studies of their possible light and colour variations. Already at that time, the astronomical literature contained ample evidence showing that a number of Be stars *were* light variables. However, almost all such findings resulted as by-products of studies of different or wider groups of objects. Feinstein (1968) was probably the first who pointed out explicitly that many Be stars are light variables. A pioneering study which was aimed at the detection of light variations of a large group of Be stars *by means of differential photoelectric photometry* was carried out by Haupt & Schroll (1974).

In 1972, our group has started systematic photoelectric observations of bright Be stars at the jointly built observing station which belongs to the Hvar Observatory in Croatia. Our original goal was to search for new eclipsing binaries among Be stars. However, already the first results arose our interest also in their long-term and rapid variations.

2. Observations and reductions

All observations were obtained with the Ondřejov 0.65-m Cassegrain telescope installed at the Hvar Observatory. A single-channel photoelectric photometer with an unrefrigerated EMI 6256S photomultiplier and UBV (Schott glass) filters has been used. During the first epoch (1972 - 1978), the data were recorded with a strip-chart recorder. In 1979, the recorder was replaced by a VF digital converter. After 1988, some observations were secured with a new, computer-controlled UBV photometer, which was tested there. The project was temporarily terminated after January 1991.

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The final reduction was carried out with a FORTRAN program HEC22 (see Harmanec et al. 1993 for the details of reductions and software). HEC22 ensures a stable and accurate transformation into the standard Johnson's UBV system. Much more accurate UBV magnitudes of all comparison, check and standard stars were also derived from about 46 000 all-sky observations secured between 1972 and 1988.

3. The principal results

The principal finding of our and other studies is that the long-term light and colour variations of Be stars are usually the most pronounced ones and that they are somehow related to the long-term spectral variations of respective stars. While we failed to discover many new eclipsing binaries among the Be stars, we *did find* a half-dozen of phase-locked periodic light variations for some known Be binaries, e. g., CX Dra, KX And, ζ Tau, or LQ And.

Soon after the observing program at Hvar was started, Percy and his collaborators begun a search for new β Cep variables among the Be stars (Percy et al. 1981). Although they were also unsuccesful in achieving their original goal, they succeeded in demonstrating that a large fraction of Be stars are low-amplitude ($<0^m.1$) light variables, varying on a time scale of 10^{-1} - 10^{0} d.

We found several well-documented cases of a clear correlation between the amplitudes of periodic short-term variations and the phase of the long-term cycle (e.g. EW Lac or o And). This fact was used as a diagnostic tool to predict new shell episodes (Harmanec et al. 1988, Pavlovski & Ružić 1991).

In passing, we wish to mention that at least in one case our original goal was finally achieved: A recent analysis of our archive data of V360 Lac (14 Lac, HD 216200) indicated that this Be star is a new peculiar eclipsing binary (P = 10.085 d). A detailed analysis, which combines our and other available photometry, and the Dominion Astrophysical Observatory spectroscopy by Dr. G. Hill, is currently under way (Hill et al., to be published).

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