Observations of B[e] stars with the Ondřejov 2m telescope

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Abstract. We present our results of spectroscopic observations of several B[e] and suspected B[e] stars. Our high-dispersion spectra of the H and near IR regions were obtained using the coude spectrograph at the Ondřejov 2m-telescope.

Introduction

Recent improvements of the optical system of the Ondřejov 2m-telescope enabled us to extend the observational program to fainter objects (e.g. SN2004dj, Korčáková et al. 2005) including the interesting class of B[e] stars. We present selected first results of observations of the following objects: V 1972 Cyg, V 431 Sct, FS CMa, OY Gem. In addition, we also observed V 2028 Cyg and V 743 Mon. Observations of the latter two stars are not shown here.

Observations and data reduction

All the observational material was obtained at the Ondřejov Observatory (Czech Republic) in 2004 and 2005 using the 2m-telescope, which is being used for a high dispersion spectroscopy. Data were secured with the SITe CCD (2000x800 pixels, pixel size 15 μm) in 700 mm camera of coude spectrograph. The resolving power in the H region is about 13 000. Data were reduced using the standard IRAF packages (cedproc and doslit) and overscan correction, bias subtraction and flat field correction in 2D were done. 1D spectra were produced using optimal extraction including sky background subtraction and cleaned for cosmics. For fitting the continuum the package SPLAT (Draper 2004) was used.

Line identification

Identifications were made with the help of the Moore tables (1972). Several lines were taken from other identification lists for B[e] stars (Jaschek et al. 1996; de Winter & van den Ancker 1997). Fig. 1 shows the identification of two parts of the OY Gem spectrum. Most of the lines belong to the Fe II ion, but in addition some lines of Mg I, Si II, [N II] and other are present. The strongest emission line
Figure 1. The spectrum of OY Gem between 6 200 Å and 6 800 Å (upper panel), and between 8 180 Å and 8 720 Å (lower panel). Identifications of most important lines are provided.
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Figure 2. The spectral region containing the He\textsc{i} 6678 Å line. Variations of the line are shown for several different moments. Individual spectra are labelled with the time of exposure in JD−2 453 000.

is Hα, for which the intensity is almost 120 times the continuum, and the line of O\textsc{i} (8 446 Å) which has an intensity about 50 continuum. Paschen lines up to P35 are seen, the P33 line is missing. The identification of the 8 451 Å feature is unclear. A very interesting region is around the lines Si\textsc{ii} 6 347 Å, [O\textsc{i}] 6 364 Å, Fe\textsc{ii} 6 369 Å, Si\textsc{ii} 6 371 Å, Fe\textsc{ii} 6 384 Å and Fe\textsc{ii} 6 385 Å (see Fig. 3).

Line profile variability

The He\textsc{i} 6 678 Å line in V431 Sct and V1972 Cyg is clearly variable, as can be seen in Fig. 2. Especially striking is the variability in V1972 Cyg, where P-Cyg type profiles change their shape dramatically. The only He\textsc{i} 6 678 line spectrum shown in Zickgraf's (2003) paper has a shape slightly similar to the most recent spectrum obtained on JD 2 453 555 (July 3rd 2005). Fig. 3 illustrates the same situation as Fig. 2, but for stars FS CMa and OY Gem, and in the region between 6 340 Å and 6 400 Å.

Conclusions

We presented the first results of our observations of B[e] stars. Our observations of V431 Sct suggest variability in the He 6 678 Å line profile. Since these changes were observed over two consecutive nights, it is also necessary to pay some attention to the rapid variability of this line. Stronger variability in this line was observed for V1972 Cyg, however, more observations with higher S/N are needed.
We plan to continue observations of our set of stars to obtain richer material, which will enable us to apply results of theoretical NLTE modeling of stellar winds (Krtička & Kubát 2004), detailed NLTE radiative transfer in axially symmetric systems (see Korčáková & Kubát, these proceedings), and numerical simulations of a stellar wind (Votruba et al. 2005) to the analysis of different classes of B[e] stars. In particular, the new Ondřejov Echelle Spectrograph (OES, Koubský et al. 2004) will provide useful data for our analysis.

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