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# HIGHLY EXCITED EMISSION LINES IN BX Mon AND ZZ CMi

Continuing the series of spectroscopic observations of symbiotic stars, we have monitored BX Mon (M Hα 61-12, Sp: M4ep) and ZZ CMi (BD +9°1633, Sp: gM6ep) since October 1979. These observations have been carried out with the one prism spectrograph mounted on the 122 cm reflector of the Astrophysical Observatory of University of Padova in Asiago. The spectral range is λλ3800-7800 Å and the dispersion is 60 Å/mm at Hγ. During our observations, some highly excited emission lines which had not been known in these stars were found, or example He II 4686 and [O III] 5007 in BX Mon and [O III] and [Ne III] in ZZ CMi.

BX Mon has been classified as a symbiotic star (Bidelman, 1954), but its detailed properties have not been well known. Allen (1979) rejected BX Mon from his list of symbiotic stars because of its low excitation stage. On the other hand, Michalitsianos et al.(1982) found emission lines of C IV, N III], O III], Si III] and C III] in their ultraviolet spectra and suggested that BX Mon could be classified as a symbiotic star.

In our observations, BX Mon showed Ti O absorption bands and emission lines of H I, He I and Fe II in October 1979. The emission line of He II 4686 was found at first on the spectra taken on November 7, 1981. Those were the first spectra for that observational season. The intensity of He II 4686 emission line decreased in February 1982 and increased again in March 1982. In the next observational season, from October 1982, He II 4686 emission line was not seen whereas a weak emission of [O III] 5007 was noticed. The appearance of the other emission lines of H I, He I and Fe II was nearly the same as that observed in October 1979. On the other hand, unusually low excitation conditions were observed in February 1980 and October-November 1983. In these periods, only Hα and Hβ were seen in weak emission while Ti O absorption bands were very distinct (Figure 1). The last phenomenon can be explained if we assume that BX Mon is a binary system and the hot component was eclipsed by the cool component at these periods. Photometric observations are waited. Intensity tracings of the spectra taken on

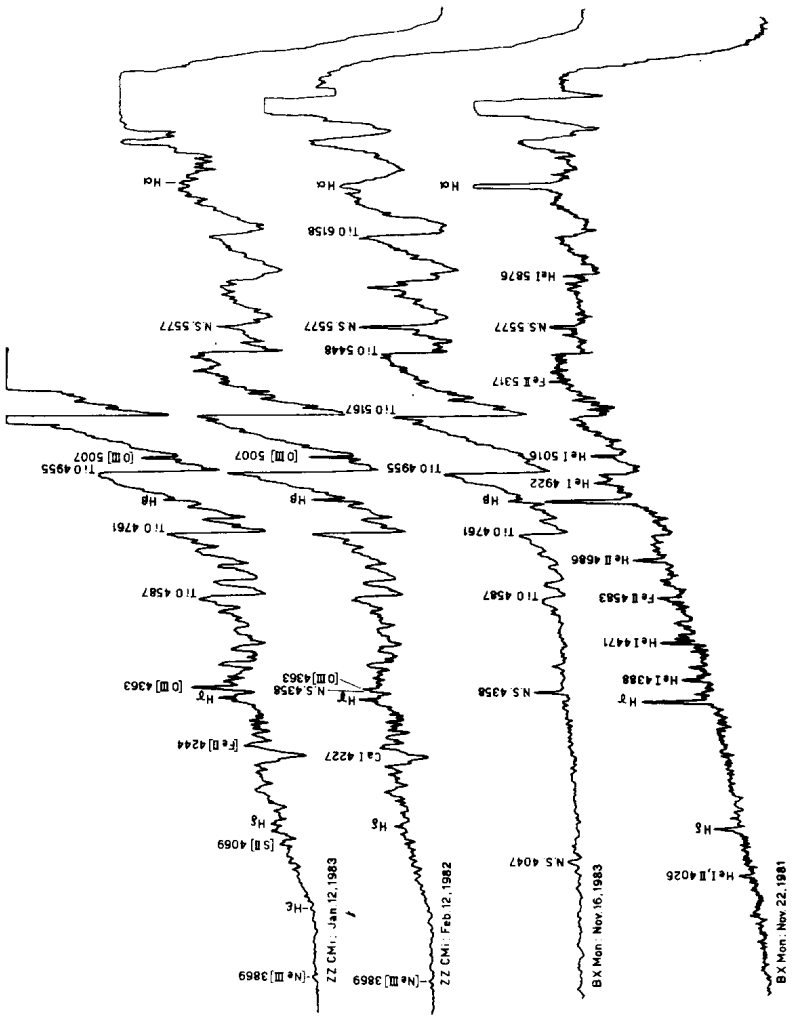


Figure 1

November 22, 1981 and November 16, 1983 are shown in Figure 1. In the figure " N.S. " indicates an emission line of the night sky.

The first detailed spectroscopic observation of ZZ CMi (BD +9°1633) was made by Sanford (1947). The spectra showed Ti O absorption bands, a strong Ca I 4227 absorption line and emission lines of Hα, Hβ, [O I] 6300 and [Fe II]. The absorption features corresponded to a spectral class M 6.

Because of the lack of highly excited emission lines, ZZ CMi has not been classified as a symbiotic star.

In our observations, weak traces of [O III] 5007 and 4363 were noticed at first on the spectra taken on November 22, 1980. Then, they grew gradually and in January 1982 [O III] 5007 became as intense as Hβ. At this time also the emission line of [Ne III] 3869 was noticed. In the next observational season, from October 1982, the emission lines of [O III] were still prominent and [Ne III] existed. The emission line of [O III] 4363 became more intense than [O III] 5007. This suggests that ZZ CMi was surrounded by a rather dense nebulosity. Intensity tracings of the spectra taken on February 2, 1982 and January 12, 1983 are shown in Figure 1.

These results indicate that BX Mon and ZZ CMi can be classified as symbiotic stars according to the criteria of Boyarchuk (1975). Their spectral variations are very interesting. Further spectroscopic and photometric observations are requested.

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