

K-band Spectra of Massive Stars in Transition Phases

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Abstract. We present *K*-band spectra of a sample of unclassified B[e] stars and report their main spectral features. These may help to assign the stars a proper evolutionary state.

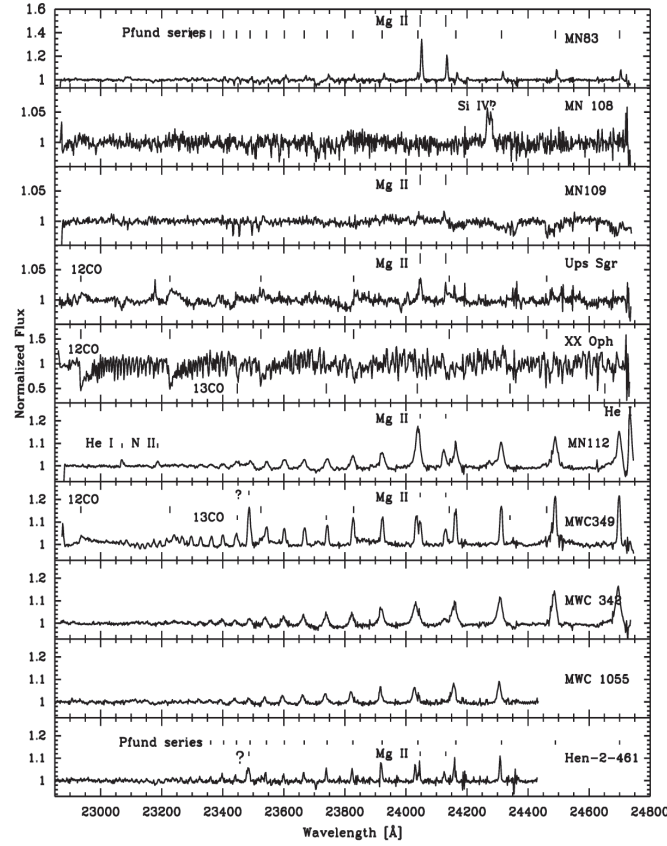
1. Introduction

Massive stars in certain evolutionary phases (e.g., luminous blue variables or B[e] supergiants) undergo strong and often eruptive mass loss. These stars are deeply embedded in shells, nebulae, or disks, which are cool and dense, and give rise to a complex chemistry, producing molecules and dust. Furthermore, they are rare and display complex spectra, where photospheric features are veiled by the circumstellar envelope. Thus, it is difficult to assign spectral types and evolutionary state to them. However, the circumstellar environments of these stars reveal information on their kinematics and mass-loss history. To contribute to the study of the circumstellar material, we started collecting near infrared spectra of a sample of unclassified B[e] stars. Here we report main features observed in the spectra of some sample stars.

2. Observations and Description of the *K*-Band Spectra

Observations in the *K*-band were performed with the GNIRS/GEMINI spectrometer mounted on the Gemini North telescope (programs: GN-2013A-Q-78, GN-2014A-Q-36 and GN-2015B-Q-89). The instrument configuration included the long-slit mode, short blue camera, 110 mm^{-1} grating, and $0'.3$ slit width, yielding a mean spectral resolution of $R = 5000$ in the spectral range 2.29–2.47 μm . We show the *K*-band spectra of the sample stars in Fig.1 and list the main features and possible classification in Table 2.

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Figure 1. *K*-band spectra of the sample stars.

Object name	¹² CO bands	¹³ CO bands	Mg II	Pfund series	Si IV	He I	N II	Suggested classification
MN83	–	–	emis.	emis.	–	–	–	LBV?
MN108	–	–	–	–	emis.?	–	–	Blue Sg.
MN109	–	–	emis.	abs.?	–	–	–	Blue Sg.?
<i>ν</i> Sgr	emis.	–	emis.	–	–	–	–	binary
XX Oph	abs.	abs.	–	–	–	–	–	binary: B0 v+M6 II
MN112	–	–	emis.	emis.	–	emis.	emis.	LBV?
MWC 349	emis.	emis.	emis.	emis.	–	–	–	unclB[e], binary
MWC 342	–	–	emis.	emis.	–	–	–	unclB[e]
MWC 1055	–	–	emis.?	emis.	–	–	–	unclB[e]
Hen 2-461	–	–	emis.	emis.	–	–	–	unclB[e]

Mg II λ 2.4047 and 2.4131 μ m, Si IV λ 2.4270 and 2.4734 μ m, He I λ 2.3070 μ m, N II λ 2.3187 μ m

Table 1. Main features identified in the *K*-band spectra of the sample stars and possible classification taken from the literature.