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The LMC star R84 (=HDE 269227 =BR 18) belongs to the group of
Ofpe/WN stars believed to be closely related to the Luminous Blue
Variables. Support for such a relation comes from the spectral
resemblance of these stars to AG Car during visual minimum, and from
the observed outburst of the Ofpe/WN star R127.

The spectral analysis of R84 presented here is based on model
calculations with the NLTE comoving-frame code described by
Wessolowski et al. (1988) and references therein. The helium model
atom was represented by 28 levels and hydrogen by 9 levels. The free
model parameters were varied until the observed line profiles and
the absolutely calibrated and dereddened continuum flux were
reproduced. The comparison of the theoretical continuum flux
distribution with the observed one yields a reddening of $E_{B-V} = 0.1$.

It was possible to determine the stellar temperature within an
intrinsic error of only a few 100 K. However, systematic effects,
e.g. from the adopted velocity law, are expected to be important.
Therefore, the accuracy of the derived parameters can be estimated
only. We believe the error in temperature to be of order 2000-3000
K. For the other parameters (Table 1), we believe the luminosity and
the mass-loss rate to be accurate to within a factor of two, and the
helium abundance uncertain by ±0.1.

Comparing the stellar luminosity and the helium abundance with
the predictions of evolutionary models (Maeder and Meynet, 1987), we
conclude that R84 is in the Post-Red-Supergiant phase and that its
initial and current masses are 25 $M_\odot$ and 15 $M_\odot$, respectively.

Table 1. The parameters of the model that reproduced best the
observed spectrum of R84 at January 13, 1982:

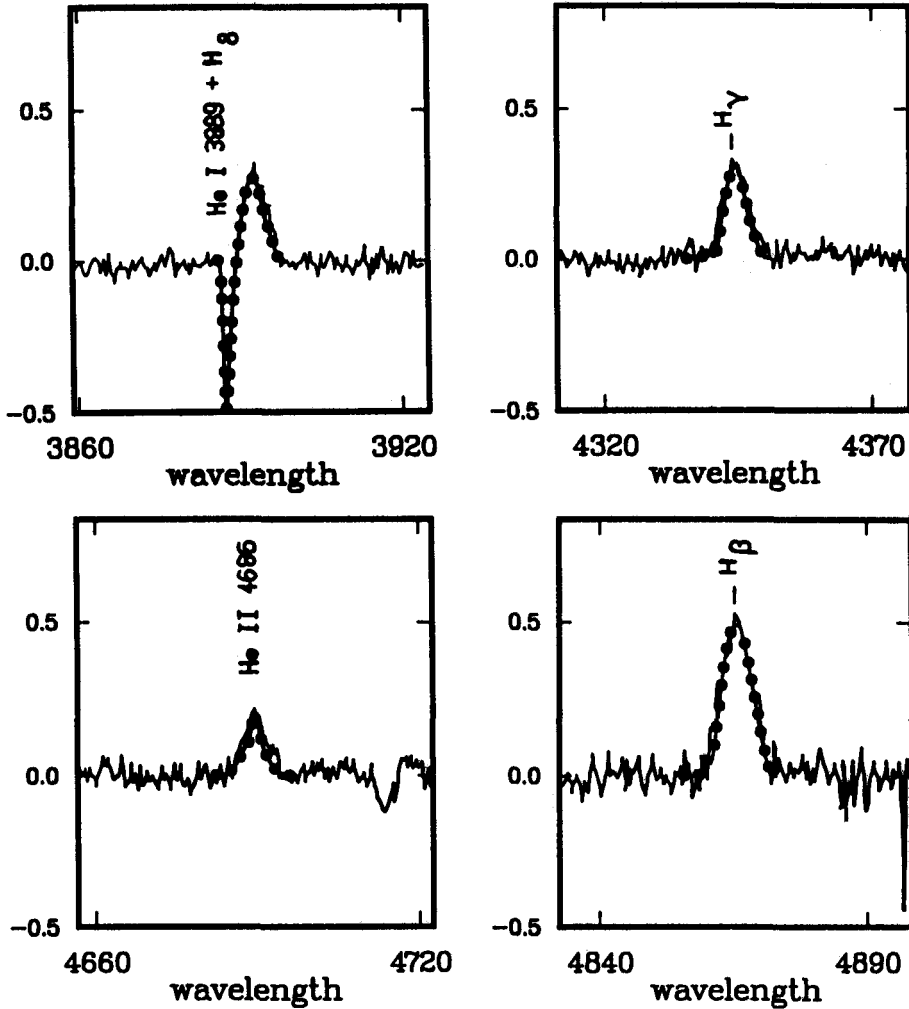| log $L/L_\odot$	R_*	T_*/K	$R(\tau=2/3)$	$T(R_{2/3})$	log $\dot{M}/(M_\odot/yr)$	N[He]
5.5	24 $R_\odot$	28500 K	29 /$R_\odot$	26000 K	-4.75	0.63

Figure 1. Observed line profiles of R84 at Jan. 13, 1982 (Stahl et al. 1982). Superimposed are the synthetic profiles calculated with the parameters given in the text. Note, that the normalized fluxes are plotted logarithmically.

References

Maeder,A., Meynet,G.: 1987, Astron. Astrophys. 182, 243
Stahl,O., Wolf,B., de Groot,M., Leitherer,C.: 1985, Astron. Astrophys. Suppl. 61, 237
Wessolowski,U., Schmutz,W., Hamann,W.-R.: 1988, A. & A. 194, 160