

# WOLF-RAYET STARS AS TRACERS OF THE RECENT HISTORY OF THE STAR FORMATION RATE

G. MEYNET

*Geneva Observatory, ch. des Maillettes 51, CH-1290 Sauverny, Switzerland*

October 25, 1993

**Abstract.** Recently Vacca & Conti (1992) have measured the ratio of the luminosity in the broad He II  $\lambda 4686$  emission feature to that in the  $H_\beta$  emission line in fourteen starburst galaxies. They related these luminosity ratios to the relative numbers of Wolf-Rayet (type WNL) to O-type stars in these galaxies (higher is the ratio  $L(\lambda 4686)/L(H_\beta)$ , higher is  $N_{WNL}/N_O$ ). They found that in general the number ratios are an order of magnitude larger than those expected in region of constant star formation rate. On Fig. 1 the predicted line ratios of our starbursts models (instantaneous burst of star formation at time  $t = 0$ ; initial mass function  $dN/dM = CM^{-2}$ ; stellar models from Meynet et al. 1993; conversion formula between the line ratios and the number ratios of WNL to O-type stars given by Vacca & Conti 1992, with  $\eta = 1$ ) are compared with the observed values given by these authors. This figure shows that a starburst taking place about 2-3 millions years ago can account for the high observed values of  $L(\lambda 4686)/L(H_\beta)$ . One sees that the effects of the age of the burst (*i.e.* the time elapsed since the burst) and of the metallicity are quite important. It is the hope that in a next future, it will be possible on the base of this kind of luminosity ratios to disentangle the various effects influencing the WR population resulting from a starburst.

## References

Meynet, G., Maeder, A., Schaller, G., Schaerer, D., Charbonnel, C.: 1993, *A&AS* in press  
 Vacca, W.D., Conti, P.S.: 1992, *ApJ*, **401**, 543

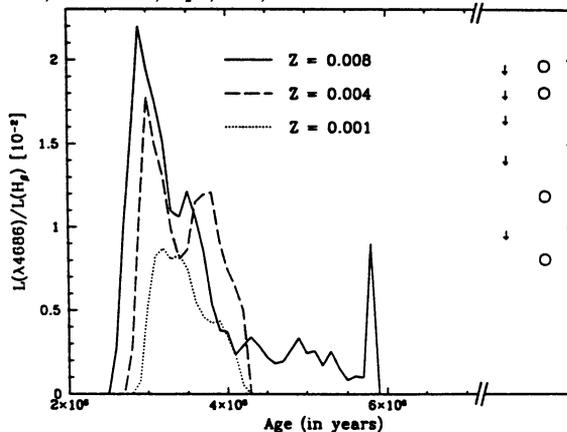


Fig. 1. Evolution with time of the ratio of the luminosity in the broad He II  $\lambda 4686$  emission feature to that in the  $H_\beta$  line predicted by our starburst models at different metallicities (see text). Among the 14 galaxies observed by Vacca & Conti, nine have  $L(\lambda 4686)/L(H_\beta) < 2.3$ . The observed values for these galaxies are given at the right of the figure; the down arrows indicate upper limits.