THE OCCURRENCE OF DIFFERENT WOLF-RAYET PHASES IN MASSIVE CLOSE BINARIES

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ABSTRACT

In a recent paper (Doom and De Grève, 1981) the remaining main sequence lifetime of the mass gaining component in massive close binary systems was computed. Using results of that paper and the definition of the four important events in the evolution of a massive close binary system (RLOF(M_1), RLOF(M_2), SN(M_1), SN(M_2)), four evolutionary stages in the life of the system can be defined: OB+OB, WR+OB, c+OB (or WR+WR) and c+WR. The two possibilities for the third stage depend on the initial mass ratio of the system. The final stage c+c, is not considered here.

We have integrated the duration of the evolutionary stages over an initial mass function $\psi(M_1+M_2)dm = (M_1+M_2)^{-2}dm$ and a mass ratio distribution $\Omega(q_i) = -0.625 + 3.125\ q_i$ in order to obtain the number of close binaries in different Wolf-Rayet stages. Close binaries were considered with initial total mass between 50 Mo and 200 $M_\odot$ and with a mass ratio between 0.2 and 1.

Vanbeveren and Conti (1980) found 33 WR stars with absorption lines in a sample of 91 WR stars. Massey and Conti (1981) concluded that 7 out of 12 investigated WR stars with absorption lines are WR+OB. From this we conclude that 18% to 25% of all WR stars are WR+OB systems. Comparing the results of Vanbeveren and Conti (1980) with our computations, we conclude that :
1. approximately 50% of all WR stars are probably truly single
2. the WR+WR systems form less than 5% of all WR stars.
The details of this investigation will be published in a separate paper (Doom and De Grève, 1982).

REFERENCES

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