A WOLF-RAYET CLUSTER IN IC 4662

O.-G. Richter[1,*] and M.R. Rosa[2,*]

[1)] Space Telescope Science Institute, Baltimore, MD 21218, U.S.A.
[2)] The Space Telescope European Coordinating Facility, European Southern Observatory, Garching, F.R.G.
[*] Affiliated to the Astrophysics Division of the Space Science Department of E.S.A.

ABSTRACT An imaging and spectroscopic survey for WR stars in IC 4662 revealed the presence of a cluster consisting of a mix of about 10 WN 7-8 and WC 5 stars plus the equivalent of some 5 OV stars at a projected distance of about 100 pc from the cluster core of the bright central H II complex.

The magellanic irregular galaxy IC 4662 had been included unsuccessfully in a series of spectroscopic searches for WR stars (see Rosa and D'Odorico 1986) which concentrated on the blue associations scattered around the galaxy's body and on the main H II complex. This complex is very similar to the 30 Dor region in the LMC. Judged from the high degree of resolution IC 4662 is possibly an outlying member of the Local Group of Galaxies. Given its small distance (adopted as 2 Mpc) we conducted a comprehensive narrow-band imaging survey through filters off- and on-line the typical WR features.

CCD images were obtained at the ESO 2.2m telescope in April 1984. For details of the instrumental setup and reduction procedures see Rosa and Richter (1988). Comparison between images taken with the different narrow band filters immediately revealed an almost point-like strong WR candidate in the outskirts of the bright H II complex, indicated in Fig. 1. Subsequently, IDS spectra with a resolution of 10 Å were taken with the ESO 3.6m telescope at the candidate position and in the central H II complex (see Fig. 2).

The candidate spectrum shows the characteristic WR features at 4650 Å and 5810 Å, very similar in appearance to those of *e.g.*, NGC 300 # 2 or NGC 604 B in D'Odorico *et al.* (1983). The main contributors to these features are WN 7-8 and WC 5 stars. This is in accord with previous results (Rosa and D'Odorico, 1986) which show that the WR population in more than 30 giant H II regions in nearby galaxies is dominated by late WN and WC 5 stars. The absolute flux in the WR bands ($\approx 3.0 \times 10^{-14}$ erg/s/cm^2/Å) can be used to estimate the number of WR stars present. The main uncertainties arise from the assumed distance to IC 4662, and the luminosities in the emission bands of the "standard" WR stars used for comparison. Assuming an absolute magnitude of -7^m in the continuum near the 4650 Å band for a typical "mixed" WN 7-8, WC 5 star, and an equivalent width of 50 Å for the 4650 Å band in such a star, about 10 such stars would be present. The

K. A. van der Hucht and B. Hidayat (eds.),
Wolf-Rayet Stars and Interrelations with Other Massive Stars in Galaxies, 653–654.

observed H_β flux of 1.2×10^{-13} erg/s/cm^2 together with an $A_V = 1^m.2$ corresponds to the Lyman continuum luminosity of about 5 OV stars. Another estimate of the number of luminous stars is obtained from the WR cluster's absolute visual magnitude [$m_V = 16^m.6$] of $M_V \approx -11^m$. If most of the blue and visual light is contributed by stars with M_V of order -6^m roughly 80 such stars are present in addition to the 10 WR stars at $M_V = -7^m$.

The relative number of massive stars (WR/O) derived above is indicative of an evolved OB association at an age $\geq$4 Myrs (see Maeder 1990) and a metallicity of [O/H] = 8.3. However, based on the close resemblance of the Im galaxy IC 4662 with the LMC, particularly the 30 Dor complex ([O/H] = 8.25), one might have expected at least a few WR stars in the main H II region. The marked absence of WR features there might be due to a smaller evolutionary age of $\leq$2 Myr. Although the limiting magnitude of our images is at least 2^m fainter than the discovered WR cluster no other WR candidates could be identified. This apparent segregation of massive star clusters in age *and* space in IC 4662, if confirmed, is exceptional.

REFERENCES

D'Odorico, S., Rosa, M., Wampler, J.E.: 1983, *Astron. Astrophys. Suppl. Ser.*, **53**, 97.
Maeder, A.: 1990, in *"Angular Momentum and Mass Loss of Hot Stars"*, L.A. Willson and R. Stalio (eds.), AMES-Trieste NATO Workshop, Kluwer Publ.
Rosa, M., D'Odorico, S.: 1986, in *"Luminous Stars and Associations in Galaxies"*, IAU Symp. No. 116, Reidel, Dordrecht, pp. 355.
Rosa, M., Richter, O.-G.: 1988, *Astron. Astrophys.*, **192**, 57.

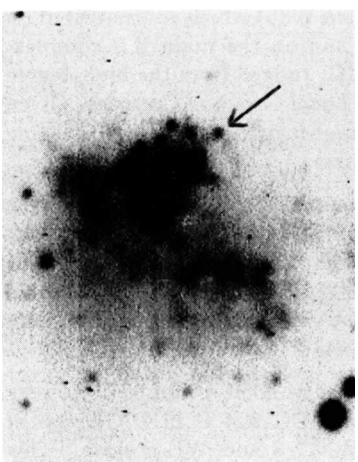
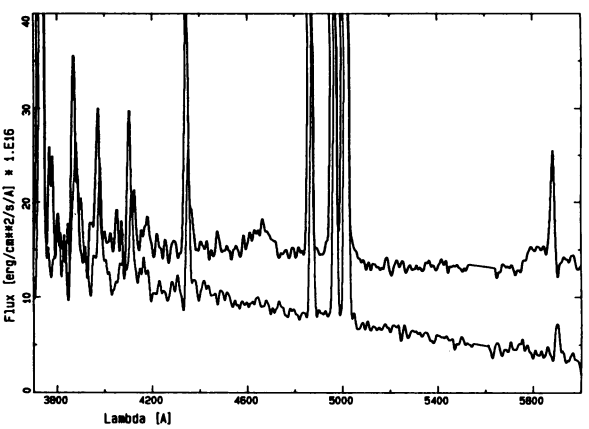


Fig. 1: IC 4662 in the light of the WR 4650 Å feature. The arrow indicates the bright candidate west of the H II complex.

Fig. 2: Spectra for the WR candidate (bold, upper) and the neighboring outskirts of the H II complex (thin, lower). The typical WR features at 4650 Å and 5810 Å are evident.



https://doi.org/10.1017/S007418090004612X Published online by Cambridge University Press