

Surface photometry of three Wolf-Rayet galaxies

M. Singh, B.B. Sanwal and C.S. Stalin

U.P. State Observatory, Manora Peak, Naini Tal 263129, India

Abstract. CCD photometric observations of the Wolf-Rayet galaxies NGC 1741, IIZw40 and IRAS 01003-2238 were taken with 104 cm telescope of the U.P. State Observatory Naini Tal using 1024 x 1024 CCD camera in B V R I and H α filters. Processing of the images were done using the IRAF and STSDAS packages. Morphology based on the analyses is discussed.

Key words : Wolf-Rayet galaxies, CCD photometry

1. Introduction

Wolf-Rayet (WR) galaxies are extragalactic objects whose integrated spectra show most commonly HeII λ 4686 emission line originating in the stellar winds of Wolf-Rayet stars. They are star burst galaxies showing strong nebular recombination lines, indicating the presence of a large number of O type stars. They are found among a large variety of morphological types, from low mass blue compact dwarfs (BCDs) and irregular galaxies, to massive spirals and luminous merging IRAS galaxies and Seyfert galaxies. WR galaxies are an important class of objects, both in terms of understanding massive star evolution and starburst phenomenon. These galaxies are in the stage of very recent star formation that produce massive stars evolving to WR phase. Because the WR phase is very short, this means that we are possibly seeing a roughly coeval sample of starburst galaxies, with the resulting opportunities for studying the dynamic evolution of star burst and for studying early phases of star burst.

Extensive observations in infrared, UV and X-ray regions are providing good data to solve the mystery of evolutionary status of these galaxies (Murphy et al., 1996, Steven and Strickland, 1998).

Conti (1991) was the first person to catalogue a sample of 37 WR galaxies. However, a recent catalogue by Schaerer et al., (1999) and the references therein, show a total of 139 WR galaxies. Optical photometric observations are available for only a few of them in recent years. A comprehensive CCD photometry programme has been undertaken at the U.P. State Observatory, Naini Tal using B, V, R, I and H α filters with 1m telescope. The observing details are given in an earlier paper Singh et al. (2000). The figures and the contour maps etc are not given here due to the space limitation.

2. Results and discussions

NGC 1741: This is one of the most luminous and well studied galaxy which is part of the Hickson (1982) compact group 31 and interacting with HCG31c. HST ultraviolet imaging and spectral analysis has been done by Conti et al. (1996) and Johnson et al. (1999). Optical images of the galaxy show highly disturbed morphology with two star burst centres, possibly arising from a galaxy merger, most likely as a result of interaction with an other member of the group. Both star burst centres are composed of several intense knots of recent star formation. Due to very large irregularities in the shape of this galaxy, it is difficult to fit an ellipse model.

IIZW40 : This is a dwarf blue irregular galaxy with a very young starburst in its central region. The spectrum and images in near infrared and optical region were taken by Vanzi et al. (1996). They conclude that this galaxy has a very small number of supernovae remnants which is supported by radio observations also. Visual images of this galaxy are dominated by the bright central core (5 x 5 arc sec size) with two faint tails extending out to 30 arcsec.

IRAS 01003-2238 : Broad HeII 4686 and NIII 4650 emission has been observed by Armus et al. (1998) in this galaxy. Based on the equivalent width of WR bump they estimate that about 10^5 WR stars are present in this luminous infrared galaxy which is the most distant WR galaxy known to us (470 Mpc). Dust lanes can be seen clearly in the V band image of this galaxy.

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