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THE CHEMICAL INTERPLAY BETWEEN THE LOCAL GROUP DWARF GALAXIES

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Dwarf galaxies are the most numerous galactic systems in the Universe. Dwarfs in the Local Group (LG) are excellent laboratories in which to study galaxy evolution. Among the bright resolved stars in the LG dwarf galaxies, the strong emission line features in the spectrum of planetary nebulae (PNe) allow us to study the late evolutionary stages of stars with low and intermediate masses, as well as the star formation history and the chemical evolution of the galaxy, within the age range of $1 - 10$ Gyr. In a series of previous studies we have investigated the chemical properties of the emission-line populations of LG dwarf galaxies, observing HII regions and PNe in galaxies presently forming stars, such as dwarf irregulars (dIrrs) and of PNe in quiescent galaxies, such as dwarf spheroidals (dSphs). The major aim of our studies is: by deriving, in a homogeneous way, the metallicity (traced, e.g., by the gas-phase oxygen abundance), in both dIrrs and dSphs, to determine the luminosity-metallicity relationship (LMR) for the LG dwarf galaxies. Ultimately, this approach can fully disentangle the differences in this relation, claimed in the past (Skillman et al. 1989; Kormendy & Djorgovski 1989), for star-forming and non star-forming galaxies.

In this framework, we present our new results for O/H of NGC 205, one of the three brightest early-type dwarf satellite of M 31. O/H of the other two are given in Gonçalves et al. (2007; 2012). Moreover, for the first time, we show the new version of the LMR of the LG dwarfs (Fig. 1), as given by the O/H of PNe. It is in agreement with the very recent LMR obtained from Fe/H of the LG dShs and dIrrs stellar population (Kirby et al. 2013). All together the nebular and stellar analysis, giving two different tracers of the galaxy metallicity, O/H and Fe/H, respectively, indicate that the two populations of galaxies follow the same LMR.

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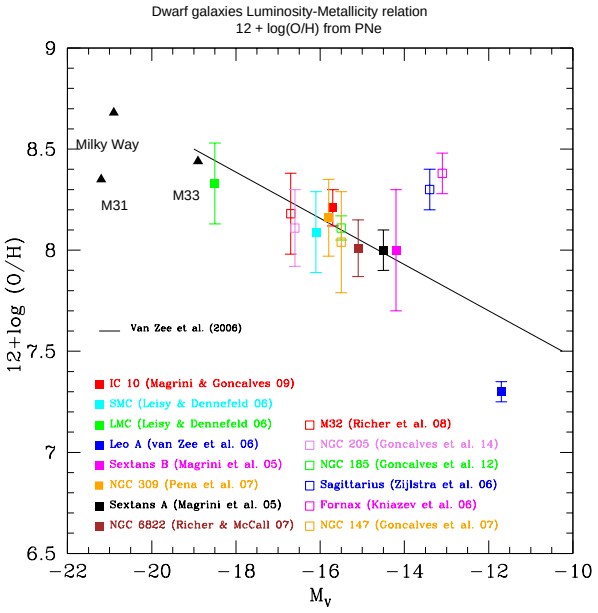

Fig. 1. The luminosity-metallicity relationship obtained using oxygen abundances of PNe in dIrrs (marked with filled symbols) and those of PNe in dSphs (empty symbols). The LMR of HII regions is shown in the continuous line (Van Zee et al. 2006). Note that the dIrr and dSph PNe abundances are in good agreement with the LMR from HII regions, with the exception of Leo A, Fornax, and Sagittarius (we are further investigating these cases). At variance with our (Gonçalves et al. 2007) and other (Grebel et al. 2003) previous results, at a given luminosity, dSphs and dIrrs have the same metallicity. Therefore, from the above LMR, the LG dSphs are not the evolved counterparts of the star-forming dIrrs.

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