RevMexAA (Serie de Conferencias), **40**, 200–200 (2011)

PLANETARY NEBULAE IN NGC 300: THE PNLF

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From images performed at the VLT of the center and an external zone in the spiral galaxy NGC 300, taken in [OIII] 5007 Å and a nearby continuum, 99 candidates to planetary nebula were identified, then it was possible to build the planetary nebula luminosity function (PNLF). The distance modulus to NGC 300 was estimated from the PNLF.

In order to state the PNLF as an extragalactic standard candle, the shape of this function has been analized in numerous studies, and it is known that it can be fitted by a cutoff exponential (Ciardullo 1989). Then the number of PNe with absolute magnitude M is given by:

$$N(M) \propto e^{0.307M}\{1 - e^{3(M^* - M)}\}\,, \qquad (1)$$

where M^* is the absolute magnitude of the brightest PN.

Mainly using the blinking technique, 66 objects with a high probability of being PNe were found in the central zone, while the number of candidates in the outer zone is 33. In addition we also used the so called central star criterion, based on the fact that PN central stars are very faint therefore not visible on the continuum frames (Hernández-Martínez & Peña 2009). Instrumental magnitudes were measured with the task *phot* of IRAF, then they were calibrated with the spectroscopical data and finally converted to apparent magnitudes following Jacoby (1989):

$$m_{5007} = -2.5\log(F_{5007}) - 13.74\,. \qquad (2)$$

The PNLF of the central zone was calculated with a bin of 0.78 mag, while for the outer zone a bin of 1 mag was used (see Figure 1). The fitted functions give us the cutoff value m^* (the apparent magnitude of the brightest PN). Therefore, after correcting for extinction, it is possible to calculate the distance modulus assuming a value for $M^* = -4.47$ as suggested by Ciardullo et al. (2002) for galaxies similar to NGC 300. Considering a reddening A(5007) $\sim$0.20 mag, the distance modulus resulted to be 26.49 ± 0.20 (central) and 26.82 ± 0.20 (outer). Only the first one is in good agreement with the value 26.37 ± 0.08 derived from Cepheids (Gieren et al. 2005).

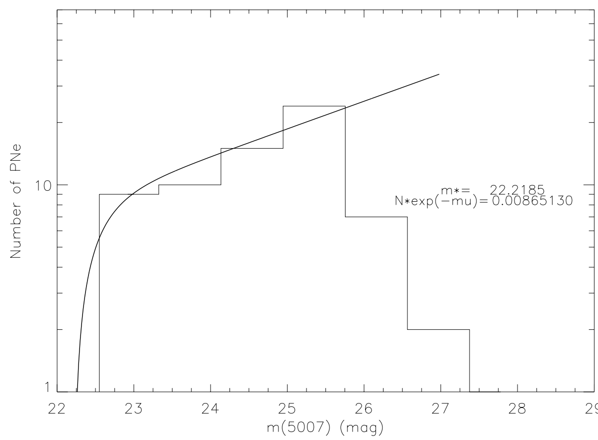

Fig. 1. The PNLF of the central zone of NGC 300.

The fact that the PNLF's, for the two zones analized, show different m^* values is not uncommon. The easy explanation is that the brightest PN is absent in the outer region. Therefore, it is important to observe the whole galaxy to detect a more complete sample of PNe. Herrmann et al. (2008) have already found significant differences among the PNLF in different regions of some face-on spiral galaxies, that can be caused by different populations of PN progenitors and differences in internal extinction of the galaxy. For the present study, the differences in PNLF's could indicate a similar scenario.

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