SEARCHING FOR PNE IN SPIRAL GALAXIES

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Extragalactic planetary nebulae (PNe) are excellent distance indicators and very useful probes of the chemical composition of the ISM at different epochs and its evolution due to low-intermediate mass stars. Outstanding astrophysical problems can be analyzed by studying PNe, which require deep observations of representative galaxies in order to obtain a complete PN sample for at least the two brightest magnitudes. For this purpose we initially observed NGC 1068 (SAB(rs)) and NGC 2681(SAB(rs)). We were only able to observe the Hα wavelength region and will require the corresponding [O III] observations to be carried out in the future.

Our main purpose was to search for PN candidates in order to: (1) Try to identify Type I PNe as those objects with [N II] 6583/Hα $\sim$ 1. (2) Analyze the behavior of Planetary Nebulae Luminosity Function (PNLF) in Hα up to three-four magnitudes below the bright end. (3) Analyze the amount of PN candidates per total galactic luminosity; as it has been suggested that the production of bright PNe varies by almost one order of magnitude among different types of galaxies. Those with bright absolute magnitudes are systematically deficient in bright PNe.

In October 2009, GTC plus OSIRIS TF (red arm, imaging mode) was used to observe the galaxies NGC 1068 and NGC 2681, each one in three observing blocks. In the following we will refer to the observations of NGC 1068 exclusively.

The observing blocks were designed in such a way that the galaxy was centered on the west zone of the field of view (CCD2). Three different positions separated 5 arcsec within each other were planned (dithered images) to center the galaxy. The tuning filter was inclined so that thw wavelength range was scanned in 6 steps differing in 15 Å, from 6584 Å to 6659 Å (to correspond to the galaxy redshift of Hα). The exposure time for each step was divided in 6 triads of individual observations of 180 s to avoid saturation of the central zone of the galaxy. The individual images have been bias subtracted, over-
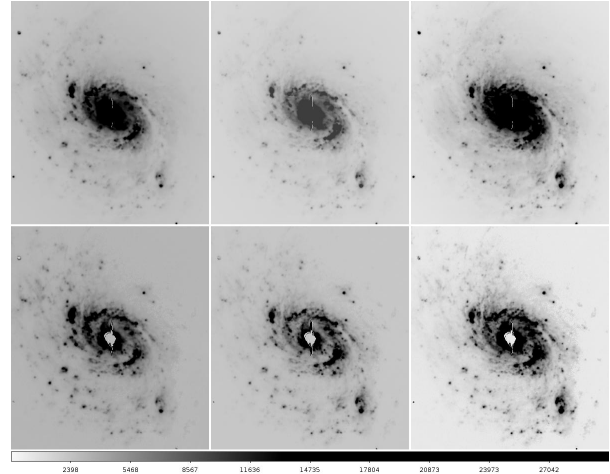

Fig. 1. Mosaic of the $82'' \times 90''$ central region of NGC 1068. Upper line presents images at 0, 15 and 30 Å from Hα. Lower line displays the same three images where the median of the 6 images has been subtracted in order to highlight the emission regions. The nucleus is saturated.

scan corrected and flat fielded. Afterwards they were combined to produce one image with a total exposure time of 540 s. The central wavelength for each step is: 6584 Å, 6599 Å, 6614 Å, 6629 Å, 6644 Å, and 6659 Å.

Results. NGC 1068 is rich in emission line regions (Bland-Hawthorn et al. 1991; Bruhweiler et al. 2001; Macchetto et al. 1994). There are many extended HII regions easily detected delineating the spiral arms as well as many compact emission objects. These latter correspond to compact HII regions, planetary nebulae, Ae-Be stars and background objects. To select PN candidates we require [O III] 5007 images. In such images planetary nebulae should appear brighter than compact HII regions. To advance in this work we require GTC-OSIRIS images with Tunable Filter in the blue!

REFERENCES

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