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MASSIVE STAR FORMATION IN EXTERNAL GALAXIES: NEW GIANT H II REGIONS

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Giant H II Regions (GH IIR) provide the link between the formation of massive stars at smaller scales and the violent processes of star formation that happen in starburst galaxies. This work aims to discover the presence of GH IIR in spiral and blue compact dwarf (BCD) galaxies and to analyze the properties of the ionized gas in order to determine the nature and evolutionary state of its source of energy. We have identified the giant nature of candidate regions and we have determined temperatures, densities and chemical abundances of the ionised gas. These giant H II regions lie, within errors, on the already observed regression in the L-σ plane.

We obtained èchelle high dispersion and long-slit low resolution spectra of several luminous H II regions in spiral galaxies NGC 7552 and NGC 6070 (Feinstein 1997) and BCD galaxy Haro 15 (Cairós et al. 2001). Spectrophotometric standards, according to the respective observing mode, were also observed.

High resolution spectra were obtained using the èchelle double spectrograph Magellan Inamori Kyocera Echelle (MIKE) at the 6.5 m, Magellan II (Clay) Telescope, LCO, in July 2004 and Echelle Spectrograph at the 100-inch du Pont Telescope, LCO, in July 2006. Low resolution spectra were secured with the Wide-Field CCD (WFCCD) camera also at the du Pont Telescope, in September 2005. The spectral range covered by the observations was from 3500 to 9300Å. The spectral resolution for MIKE instrument configuration is equivalent to 7 $\mathrm{kms^{-1}px^{-1}}$, for Echelle Spectrograph at du Pont Telescope equivalent to 6.72 $\mathrm{kms^{-1}px^{-1}}$ and for the WFCCD camera is $\Delta\lambda$=4.2Å $\mathrm{px^{-1}}$ at 4500Å.

From new high resolution spectra of the HII regions NGC 6070-I, NGC 6070-II, NGC 6070-III, NGC 6070-IV, NGC 7552-I and B, C, D & E knots from Haro 15, we have confirmed the giant nature of all of them. We have obtained their radial velocity, dispersion velocity (Firpo et al. 2005) and emission line fluxes. While the velocities of GH IIR in spirals such as NGC 6070 can be linked to host galaxy rotation, this does not seem to be the case for Haro 15.

Making use of diagnostic diagrams, we can confirm that their mechanism of excitation is photoionisation by stars and we have found that our GH IIR in the spiral galaxies present solar chemical abundance. Our preliminary analysis of HII regions at BCD galaxies points towards lower metallicities, as expected. We were able to derive upper limits for the electronic temperatures only for the regions NGC 6070-I, NGC 6070-IV and Haro 15-B.

TABLE 1

KINEMATICAL DATA DERIVED FOR THE OBSERVED HII REGIONS[a]

NGC	Velocity ($\mathrm{km\ s^{-1}}$)	Vel. Disp. ($\mathrm{km\ s^{-1}}$)	Error	n	T([OIII]) (K)
6070-I	1860	20	2,03	17	11000
6070-II	1884	28	4,26	16	...
6070-III	2177	22	1,94	17	...
6070-IV	1851	21	2,35	16	10500
7552-I	1610	36	1,57	17	13600
Haro15-B	6388	35	4,31	21	...
Haro15-C	6488	23	6,29	6	...
Haro15-D	6489	16	2,87	3	...
Haro15-E	6366	19	7,03	9	...

[a]Heliocentric radial velocities are listed in Column 2, and the average value of the turbulent velocity σ shown in Column 3. Column 4 gives an indication of the uncertainty in the estimation of the turbulent velocity, obtained after averaging over n number of emission lines, shown in Column 5.

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