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INTEGRAL FIELD SPECTROSCOPY OF THE TWO COMPLEXES OF HII REGIONS IN THE MAIN GALAXY OF THE MINOR MERGER AM2306-721

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We present a study of two complexes of HII regions in the main galaxy of minor merger AM 2306-721. The observations were obtained with the GMOS-IFU on the Gemini South telescope. By using different discrimination criteria, we determined that shock-ionized gas fraction ranges between 0% and 35%, which are in good agreement with numerical models. Thus, we conclude that almost all the mechanical energy from stellar winds and supernovae is being irradiated.

In spite of the importance of understanding feedback in star formation activity in the context of galaxy evolution, the observational constraints of this parameter are still poorly known (Hong et al. 2011). One of the largest unexplored issues is the "energy efficiency" of the feedback, i.e., what fraction of mechanical energy coming from stellar winds (SW) and supernovae (SN) is available to drive large-scale outflows. In this work we present integral field spectroscopy of two complexes of H II regions hosted in the main galaxy of the minor merger AM 2306-721, which are called as A and B (see Fig. 1).

In order to distinguish the ionization mechanisms of the ionized gas of the complexes A and B, we use diagnostic diagrams to compare the line emission ratios of these regions with those predicted by photoionization and shock models. The photoionizing and shock-ionization models used in this work were taken from Kewley et al. (2001) and Allen et al. (2008), respectively. In order to quantify the H_α luminosity due to shock, $L_{H_\alpha,sh}$, we follow the criteria proposed by Hong et al. (2011). Then, we find that the $L_{H_\alpha,sh}$ emission of complexes A and B ranges $\sim$ 2 %–35% and $\sim$ 0 %–30%, respectively. We can compare these fractions with those expected by theoretical models by following the procedure proposed by Calzetti et. al. (2004). The expected $L_{H_\alpha,sh}$ was calculated by choosing the Starburst99 models (Leitherer et al. 1999) that better match with our observations and assuming $L_{H_{\alpha,sh}} = 0.025 L_{mech}$, where L_{mech} is the mechanical luminosity produced by the stellar cluster (Binette et al. 1985). We find a theoretical prediction of $L_{H_\alpha,sh}$ fraction for complexes A and B of $0.33^{-0.09}_{+0.18}$ and $0.32^{-0.08}_{0.13}$, respectively. Then, we conclude that virtually almost all mechanical energy coming from SW and SN is being irradiated.

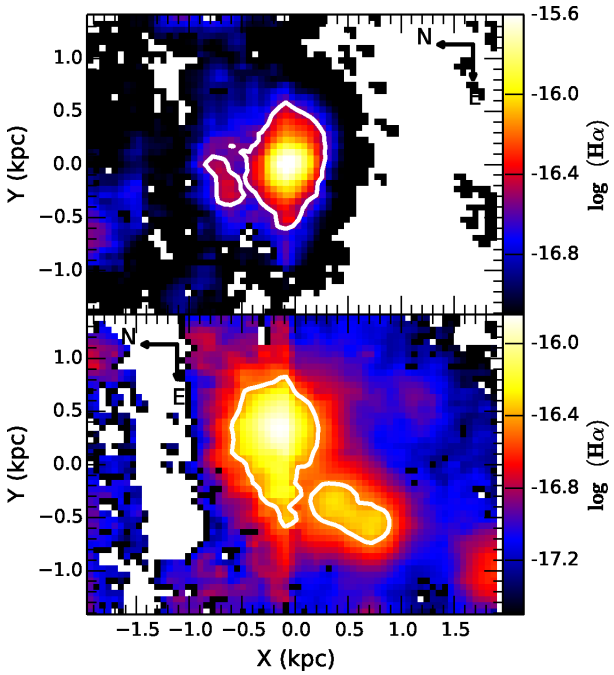

Fig. 1. Hα maps for complexes A (top panel) and B (bottom). The flux unit is erg s^{-1} cm^{-2}.

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