

Poster Contributions

Outlying H α blobs in SDSS IV MaNGA

Omkar Bait¹, Yogesh Wadadekar² and Sudhanshu Barway³

¹National Centre for Radio Astrophysics, Tata Institute of Fundamental Research, Post Bag 3, Ganeshkhind, Pune 411007, India
email: omkar@ncra.tifr.res.in

²National Centre for Radio Astrophysics, Tata Institute of Fundamental Research, Post Bag 3, Ganeshkhind, Pune 411007, India
email: yogesh@ncra.tifr.res.in

³Indian Institute of Astrophysics (IIA), II Block, Koramangala, Bengaluru 560 034, India
email: sudhanshu.barway@iiap.res.in

Abstract. We have discovered a population of 29 outlying H α emitters which appear like unresolved blobs in the DR14 data release of the SDSS IV MaNGA integral field unit survey. They do not have any underlying optical continuum emission in deep imaging from the DECam Legacy Survey or Beijing-Arizona Sky Survey. These blobs either lie away from the disc of the host galaxy in the MaNGA IFU and/or have velocities which are different from the velocity map of the host galaxy. Interestingly, all of them show photoionisation due to star formation. These galaxies have very high specific star formation rates compared to the known population of dwarf galaxies. However, their metallicities are consistent with or even lower than those of the local volume dwarfs. Thus, we can possibly rule out tidal dwarf galaxies. They could represent a new population of low mass and starbursting dwarf galaxies.

Keywords. galaxies: evolution, galaxies: statistics, galaxies: structure, galaxies: dwarf

1. Introduction

Several studies have found the most extreme emission line galaxies, which have very little stellar continuum in their spectrum, but have large amounts of H α emitting gas due to star formation, e.g., the H α emitters at $z \sim 4$ (Shim *et al.* (2011)), and in the local Universe (Shim & Chary (2013)). Other examples of such objects include the green pea galaxies (Cardamone *et al.* (2009)), and their smaller counterparts – blueberries (Yang *et al.* (2017)). Studying such dwarf galaxies are important from the point of view of reionisation, since these faint starbursting dwarfs, can leak a significant amount of their Lyman α continuum photons, which can, in turn, contribute to reionisation (Izotov *et al.* 2016).

In this work, we have used the DR14 data release of the Sloan Digital Sky Survey (SDSS) IV MaNGA integral field unit (IFU) survey, to identify extreme emission line regions with no optical counterparts in the SDSS imaging, and the deeper imaging from the DECam Legacy Survey or Beijing-Arizona Sky Survey (DECaLS/BASS). These outlying H α blobs are selected in such a way that they lie away from the disc of the host galaxy around which the MaNGA IFU is centered and their velocity is different from the velocity map of the host galaxy. In some cases, where the H α blobs lie near the disc of the host galaxy but have different velocity from the host are also selected in the sample. Starting from a sample of ~ 2700 currently released MaNGA galaxy sample we identify 29 outlying H α emitting blobs.

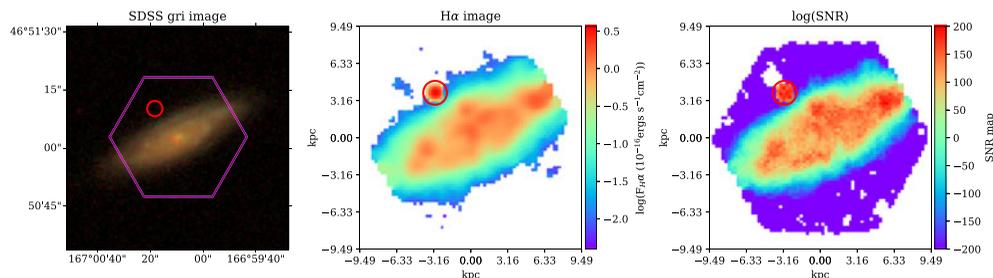


Figure 1. Left Panel: SDSS *gri* color composite image with the IFU extent shown in purple. Middle panel: H α image of the host galaxy. Right Panel: SNR map of the H α emission. The red circle shows the location of the outlying H α emission. See text for details. (cf. Bait *et al.* 2018 (submitted), submitted)

2. Results

Fig. 1 shows an example of an outlying H α blob in our sample. The left panel shows the SDSS optical *gri* color composite image, with the IFU extent shown in purple. The central panel shows the H α image of the galaxy and the right panel shows the signal to noise ratio map. The red circle in all the panels shows the location of the H α blob. Notice that there is no bright optical counterpart to the H α blob. We have discovered 29 such outlying H α blobs in the entire SDSS MaNGA survey. Their location on the Baldwin Philip and Terlevich (BPT) diagram shows that all of them are photoionised due to star formation. Thus they are candidate low mass and starbursting dwarf galaxies.

By making apertures around the H α blobs we estimate their total star formation rate (SFR) and metallicities (using the [NII]/H α) calibrator. We use the non-detections in the optical imaging to estimate the upper limits on their total *B*-band magnitude (M_B). We compare these emitters on the SFR- M_B relation, and find that they have higher SFRs for their given M_B , compared to the known population of dwarfs. Interestingly, their metallicities shows that these dwarf galaxies have metallicities which are either consistent with or lower than the metallicities expected from the standard M_B -metallicity relation. However, this can possibly rule out tidal dwarf galaxies, since they usually have higher metallicity than the standard relation for dwarfs.

References

- Shim, H., & Chary, R.-R. 2013, *ApJ*, 765, 26
 Shim, H., Chary, R.-R., Dickinson, M., *et al.* 2011, *ApJ*, 738, 69
 Cardamone, C., Schawinski, K., Sarzi, M., *et al.* 2009, *MNRAS*, 399, 1191
 Yang, H., Malhotra, S., Rhoads, J. E., & Wang, J. 2017, *ApJ*, 847, 38
 Izotov, Y. I., Schaerer, D., Thuan, T. X., *et al.* 2016, *MNRAS*, 461, 3683
 Bait., *et al.* 2018, submitted