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uGMRT observations of AGNs in dwarf galaxies

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Abstract

Feedback is likely to play an essential role in the evolution of dwarf galaxies. Only stellar feedback processes have been thought to be active in dwarf galaxies, as large AGNs were seen to be hosted only by larger galaxies. However, recent observations identified a considerable number of dwarf galaxies with AGNs; hence, the AGN feedback processes could be important for the evolution of dwarf galaxies. These AGNs are primarily identified and studied using optical spectroscopic observations. Very few radio studies exist in the literature on these at frequencies less than 1.4 GHz.

Here we present the observations of four AGN, namely J0100-01, J0906+56, J0954+47 and J1005+12, hosting dwarf galaxies using the upgraded Giant Metre Wave Telescope (uGMRT) at multiple bands. These galaxies have been identified with the fastest and brightest outflows of gas [1]. With our low-frequency multi-band uGMRT observations, we are able to detect radio emissions from the AGNs in our target dwarf galaxies. We also discuss the possible jet-ISM interaction of our dwarf galaxies. With our resolved observations, we deduce the fraction of the AGN power deposited into the ISM. We also investigate the properties like the mass and age of the black hole hosting the AGNs in these galaxies. Using radio luminosity, we calculate the black hole mass using the scaling relation (fundamental plane relation) of [2] as:

$$\log L_R = (4.80 \pm 0.24) + (0.78 \pm 0.27) \log M_{BH} + (0.67 \pm 0.12) \log L_X, \quad (1)$$

where L_R is the radio luminosity at 5 GHz (computed from our observed flux and spectral index), and L_X is the X-ray luminosity available in the literature. Further, using the BH mass and age, we comment on the growth rate of the black hole and how the environment (i.e., the host galaxy) can influence the same.

References

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