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Radio Continuum Observations of analogues of the Sources of Cosmic Reionization

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The nature of sources that led to the last phase transition of matter in the Universe, namely the cosmic reionization, remains an open question in astrophysics. It is widely believed that low-mass star-forming galaxies (emission lines galaxies, Lyman alpha emitters and related objects) are the major contributors to reionization. Thus they have been intensely studied at multiple wavelengths using state-of-the-art facilities including HST, 10m-class telescopes and others. Recently the first large sample of Lyman-Continuum (LyC) emitting galaxies has been found at low redshift (z~0.3) with HST and the SDSS, revealing objects with strong ionising hoton production and high LyC photon escape fractions (fesc), which are cosmologically relevant, and with properties making them the best analogues of the sources of cosmic reionization.

To better understand the nature, the physical processes at play, and the multi-wavelength SEDs of these interesting galaxies we have undertaken the first radio continuum (RC) observations of such objects. We will present the first results from this study using the Very Large Array (VLA) multiple radio bands (1.5-8 GHz). We have also observed a subset
of the sample using the GMRT at low frequencies (0.3-1.2 GHz).

We have detected the RC in a sample of Low-z LyC emitting galaxies. Their radio-spectral energy distribution (SED) at GHz shows a wide variety along with evidence for spectral steepening and free-free absorption. We find a tentative correlation between the radio spectral index and fesc. Furthermore, our galaxies show a deviation from the
standard radio-SFR relation. These multi-frequency radio observations provide unique insights into the physical properties of the interstellar medium and feedback
processes in these galaxies which are in turn related to LyC escape.

Our observations will provide guidance for future multi-wavelength studies of high-redshift galaxies and searches for LyC emitters with upcoming highly sensitive facilities like the SKA.

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