Dwarf Galaxies: From the Deep Universe to the Present
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The H I Neighborhoods Around STARBIRDS

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Abstract. Starbursts are finite periods of intense star formation (SF) that can dramatically impact the evolutionary state of a galaxy. Recent results suggest that starbursts in dwarf galaxies last longer and are distributed over more of the galaxy than previously thought, with star formation efficiencies (SFEs) comparable to spiral galaxies, much higher than those typical of non-bursting dwarfs. This difference might be explainable if the starburst mode is externally triggered by gravitational interactions with other nearby systems. We present new, sensitive neutral hydrogen observations of 18 starburst dwarf galaxies, which are part of the STARburst IRregular Dwarf Survey (STARBIRDS) and each were mapped with the Green Bank Telescope (GBT) and/or Parkes Telescope in order to study the low surface brightness gas distributions, a common tracer for tidal interactions.

1. Introduction

We present initial results from a large, single-dish H I study of starburst dwarf irregular galaxies selected from the STARBIRDS project (McQuinn *et al.* 2010a,b, 2015). The purpose of these observations is to search for diffuse, extended neutral hydrogen gas that may provide clues to the trigger mechanism responsible for the starburst activity present in the targets. If dwarf galaxies mimic their more massive spiral galaxy counterparts, then it is possible that interactions and mergers are a dominant trigger for starburst dwarfs as studies of individual galaxies suggest. To date, there is no comprehensive survey of starburst dwarfs aimed at searching for diffuse, extended H I emission. Our data aim to reveal the role of interactions and mergers in starburst dwarf galaxies.

2. Observations

We used the Robert C. Byrd Green Bank Telescope and the Parkes Telescope to map large spatial areas around all of the STARBIRDS dwarf irregular galaxies. We used an on-the-fly mapping strategy to fully sample all of our target regions. For the GBT data, we used a combination of in-band frequency switching and spatial pixels at the edge of our maps that were free of H I emission for calibrating the spectra. By combining these

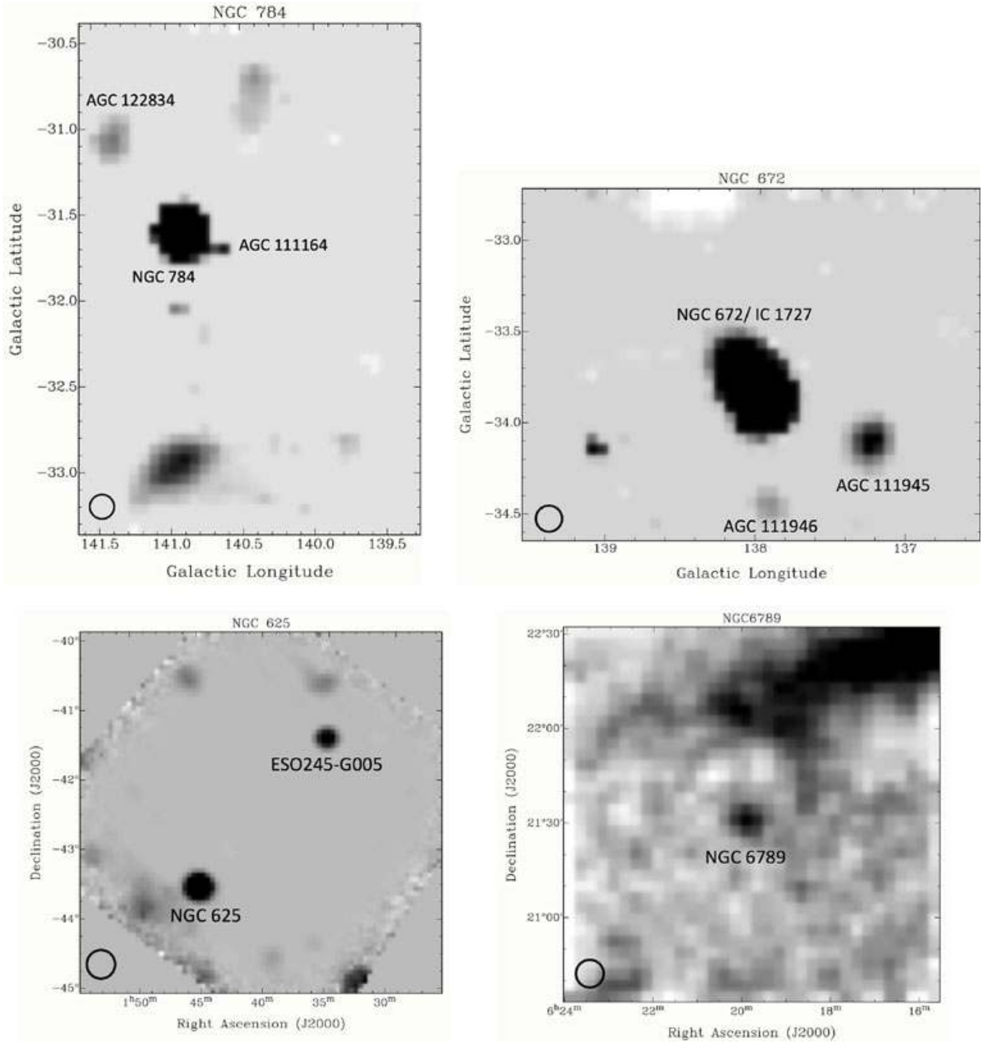

Figure 1. Top left: GBT map of starburst dwarf irregular (dIrr) NGC 784 interacting with AGC 111164. Top right: GBT map of quiescent dIrr NGC 672 interacting with IC 1727. Bottom left: Parkes map of post-starburst dIrr NGC 625 with companion ESO 245-G005 showing no H I signs of interaction. Bottom right: GBT map of post-starburst dIrr NGC 6789 showing strong foreground Milky Way emission. The resolution of the single-dish is shown by the black circle in the bottom left corner of each image and all known sources are labeled.

methods, we improved our baseline fitting methodology and results. Our sensitivity to H I column density in a 10 km s^{-1} line at a 1σ level is $N_{HI} = 3 \times 10^{17}$ cm^{-2} for our GBT data and $N_{HI} = 6 \times 10^{16}$ cm^{-2} for the Parkes data, which is the sensitivity level that diffuse H I emission is most effectively probed (Pingel *et al.* 2018).

3. Results

In order to distinguish real emission from spurious signals, we used the Source Finding Application (SoFiA, Serra *et al.* 2015) to produce our integrated neutral hydrogen moment maps. We find that out of the 15 starburst, post-starburst, and quiescent targets that we mapped with the GBT and Parkes telescopes, 5 systems appear to be interacting,

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3 systems have companions but are not interacting, and 7 systems have no companions detectable in HI at our sensitivity and spatial resolution limits. Therefore, it seems that interactions play a role in at least some starbursts. A selection of integrated intensity maps displaying the range of environments of the STARBIRDS sample is shown in Fig. 1. A more detailed analysis is currently under way (Johnson *et al.* 2019, in preparation).

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