The LITTLE THINGS Project

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ABSTRACT We present the LITTLE THINGS project, a multi-wavelength dataset consisting of 41 relatively normal, nearby (<10 Mpc) gas-rich dwarf irregular galaxies. LITTLE stands for Local Irregulars That Trace Luminosity Extremes, and is the low-mass, low-metallicity extension of THINGS, The H I Nearby Galaxy Survey. Our data include *GALEX* UV images, ground-based *UBV* and Hα images, some ground-based *JHK* images, *Spitzer* archival mid-IR images, and H I-line maps. The H I maps, obtained with the VLA, go deep (12/6/2 hrs in B/C/D arrays) and are characterised by high spectral resolution (<2.6 km s^{-1}) and high angular resolution (typically 6", which is 110 pc at the average distance of our sample). Our datasets trace the stellar populations, gas content and structure, dynamics, and star formation indicators in the galaxies, and are being used to answer questions about star formation in dwarf galaxies. We give here an overview of the data and the project's aims. All data have now been made publicly available and can be accessed at the following URL: **https://science.nrao.edu/science/surveys/littlethings/the-little-things-survey**

Science Drivers

What regulates star formation in small galaxies?
The standard large-scale gravitational instability model does not work in dwarfs or the outer disks of spirals where the gas density is below the critical threshold and is stable to spontaneous perturbations.
What is the relative importance of sequential triggering for star formation in small galaxies?
Stars can trigger subsequent star formation by rearranging the gas through winds and supernova explosions, but how important is this process? H I and optical observations of dwarfs show a correlation between the star formation rate and the *V*-band surface brightness, which emphasises ~Gyr old stars. This suggests that the existing stars are important for triggering new stars.
What is the relative importance of triggering by random turbulence compression in dwarf galaxies?
Turbulence can account for various phenomena that are indirectly related to star formation. Is turbulence the key to allowing star formation to proceed in a normal fashion in dwarfs even though the gas density is sub-critical? And, what regulates turbulence?

What is happening in the far outer parts of dwarf galaxies, where star formation continues in gravitationally stable gas?
Densities of gas in outer disks of dwarfs and spirals are sub-critical by more than an order of magnitude. Yet star formation is on-going out there. Is turbulence the only remaining process to trigger star formation there?
What happens to the star formation process at breaks in the exponential light profiles?
There is a change in slope in the exponential surface brightness light profiles of the outer disks of 20-40% of dIm and spiral galaxies and disks at high *z*. This break implies some sort of transition in the star formation process at the break radius.
What happens in Blue Compact Dwarfs (BCD)?
BCDs are dIm galaxies in which the central star formation rates jump by a factor of ~10, but not all BCDs show signs of a galaxy-galaxy interaction on which to blame the starburst.

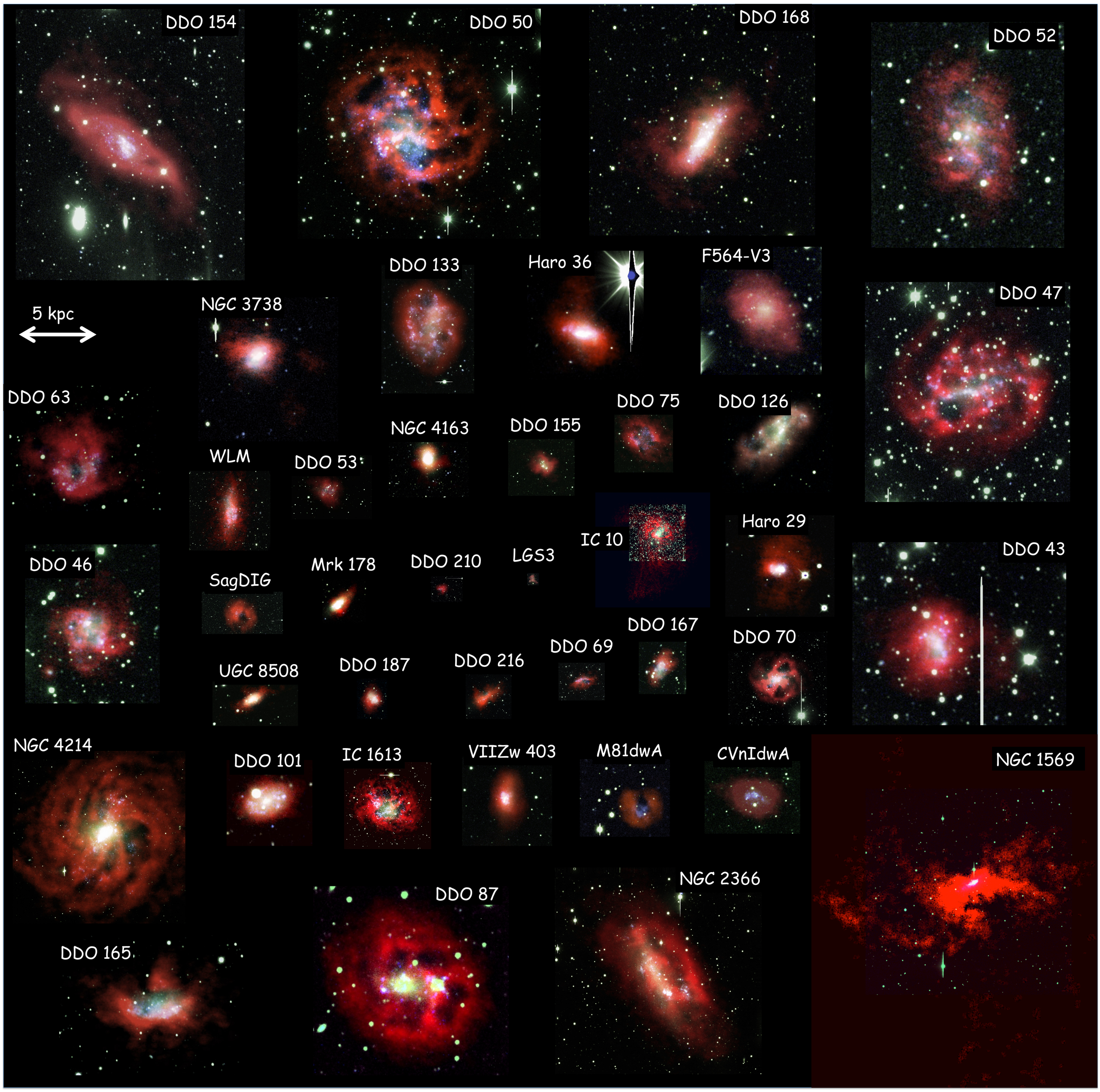

Figure: Mosaic of the galaxies making up the LITTLE THINGS sample; images are shown at the same linear scale (courtesy Kim Herrmann). The colours correspond to H I (red), *V* (green), FUV (blue; a few are Hα or NUV instead)

The LITTLE THINGS team is grateful to NRAO for telescope time and for support of team and public data access and to the National Science Foundation for funding through grants AST-0707563 (DAH), AST-0707426 (BGE), AST-0707468 (CES), and AST-0707835 (LMY). We thank Ms. Lauren Hill for her help in producing the color images