Galaxies in 3D across the Universe
Proceedings IAU Symposium No. 309, 2014
B. L. Ziegler, F. Combes, H. Dannerbauer, M. Verdugo, eds.

doi:10.1017/S1743921314010199

A Radio-Optical Study of Resolved Star Formation in SAMI Galaxies

Sarah Leslie[1,3], Lisa Kewley[1], Elaine Sadler[2,3] and Julia Bryant[2,3,4]

[1]Research School of Astronomy & Astrophysics, Australian National University, Cotter Road, Weston, ACT 2611, Australia
email: u5022102@anu.edu.au
[2]Sydney Institute for Astronomy (SIfA), School of Physics, The University of Sydney, NSW 2006, Australia
[3]ARC Centre of Excellence for All-sky Astrophysics (CAASTRO)
[4]The Australian Astronomical Observatory, PO Box 915, North Ryde, NSW, 1670, Australia

Abstract. With integral field spectroscopic data from the the Sydney-AAO Multi-object Integral-field spectrograph (SAMI) survey and the VLA, we will study the relationship between star formation (as traced by Hα emission) and the radio continuum emission within galaxies with the aim of better understanding the intricacies of local scaling relations.

Keywords. galaxies: star formation, radio continuum: galaxies, galaxies: magnetic fields

1. Project Summary

Despite many decades of study, the relation between radio continuum emission and the star-formation rate (SFR) in galaxies is still not well understood. Previous studies have indicated that the tight correlation between radio and far infrared (FIR) flux used to derive local scaling relations between the radio continuum power and SFR breaks down for faint, low metallicity, low mass galaxies. To better understand these scaling relations across a range of stellar masses, we will combine resolved radio continuum information with the spatially resolved information on gas and stellar processes derived from optical integral field spectroscopy (IFS). We will draw our IFS data for galaxies spanning a wide range of stellar masses from the first massively multiplexed IFS survey, the Sydney-AAO Multi-object Integral-field spectrograph (SAMI) galaxy survey. Our radio data are from the VLA Faint Images of the Radio Sky at Twenty-centimeters (FIRST) survey, supplemented by our own deeper VLA observations. In this project we aim to:

- Compare the spatial distribution of star-forming regions in galaxies with the brightness profile of the radio emission to better understand the radio emission as a SFR tracer within galaxies. In particular we will also
  - study low mass star-forming galaxies which fall off the radio-SFR relations for larger galaxies and
  - investigate whether the mix of thermal and non-thermal radio emission in star-forming galaxies changes with galaxy stellar mass and metallicity.
- Understand the role played by the ordered magnetic field in galaxies, and test whether the dominant mechanism for radio emission is different in dwarf galaxies which often lack this ordered magnetic field.

Acknowledgements

This research is supported by the Australian Research Council Centre of Excellence for All-sky Astrophysics (CAASTRO), through project number CE110001020.