

## Tracing Star Formation Across Cosmic Time with Radio Surveys

Radio emission is a superb tracer of star formation across the Universe. As such measuring the star formation history of the Universe is a key science goal of the [Square Kilometre Array](#) (SKA). To prepare for the SKA surveys we need to obtain a better understanding of distant star-forming galaxies which exist in surveys with the SKA precursors.

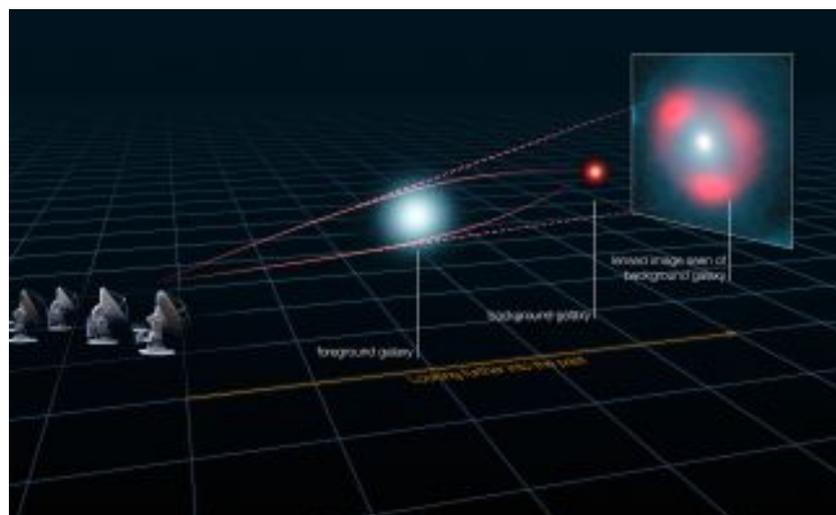
The [Evolutionary Map of the Universe](#) (EMU) survey conducted by the [Australian SKA Pathfinder](#) (ASKAP) will detect powerful star-forming galaxies out to when the Universe was a quarter of its current age. However, to detect less powerful star-forming galaxies at high redshift we will have to take advantage of gravitational lensing. This phenomenon occurs when a massive galaxy along the line of sight magnifies and distorts the light from a background galaxy. Several lensed star-forming galaxies are known, but are poorly studied in the radio.

The aims of this project are:

- (i) using the GAMA survey fields with broad and deep radio coverage (from EMU and MWA), establish the radio properties of highly luminous star forming galaxies at high redshift. Determine how similar or different they are local star forming galaxies,
- (ii) from the wide area radio surveys determine the radio properties of known lensed high redshift star forming galaxies and model this radio emission,
- (iii) using our knowledge of known lensed star forming galaxies search for new candidates, obtain their redshifts and determine their properties. This part of the project will leverage Australia's partnership with the [European Southern Observatory](#) and their telescopes in Chile.

This project will uniquely exploit the frequency coverage and wide survey area of many Australian radio telescopes such as the ATCA, ASKAP and the Curtin-operated telescopes MWA.

Figure 1: A schematic representing how light from a distant galaxy is distorted by the gravitational effects of a nearer foreground galaxy known as Einstein rings. This project will study known lensed distant star-forming galaxies as well as searching for more candidates. (Image: © ALMA (ESO/NRAO/NAOJ), L. Calçada (ESO), Y. Hezaveh et al.)




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### Research Field

Radio Astronomy

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### Project Suitability

PhD

Masters/Honours

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### Project Supervisor

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