

Multi-wavelength approach to uncover the origin of extreme emission line galaxies

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Description: The Cosmic dawn represents the first billion years in our Universe's history, where the seeds of galaxies such as our Milky Way first formed. These early galaxies, mostly dwarfs similar to the Large and Small Magellanic Clouds, were producing stars 100 times faster than today's galaxies. Traditional observations struggle to analyse the environment of galaxies within the first billion years due to their faintness and compactness. This research project aims to use a special class of galaxies called Extreme emission Line Galaxies (EELGs) as proxies (mimics) for the first galaxies. Using EELGs, we will indirectly determine the physical process feeding the star formation and growth of the central supermassive blackhole in EELGs.

Our project will combine data from a new Australia-led survey on **the James Webb Space Telescope "OutThere"** with the deep radio imaging from the MIGHTHEE survey on **the MeerKAT Telescope in South Africa (a Square Kilometre Array precursor)** to reconstruct the star formation history and identify the contribution of active black holes to EELGs.

The successful candidate will be in a vibrant research environment across the two ICRAR nodes (Curtin and UWA), along with being part of two international collaborations (OutThere and MIGHTHEE). The project is suited to students from a broad range of backgrounds in Physics/Math and an interest in Astronomy. Experience with Python or other programming languages is highly desirable.

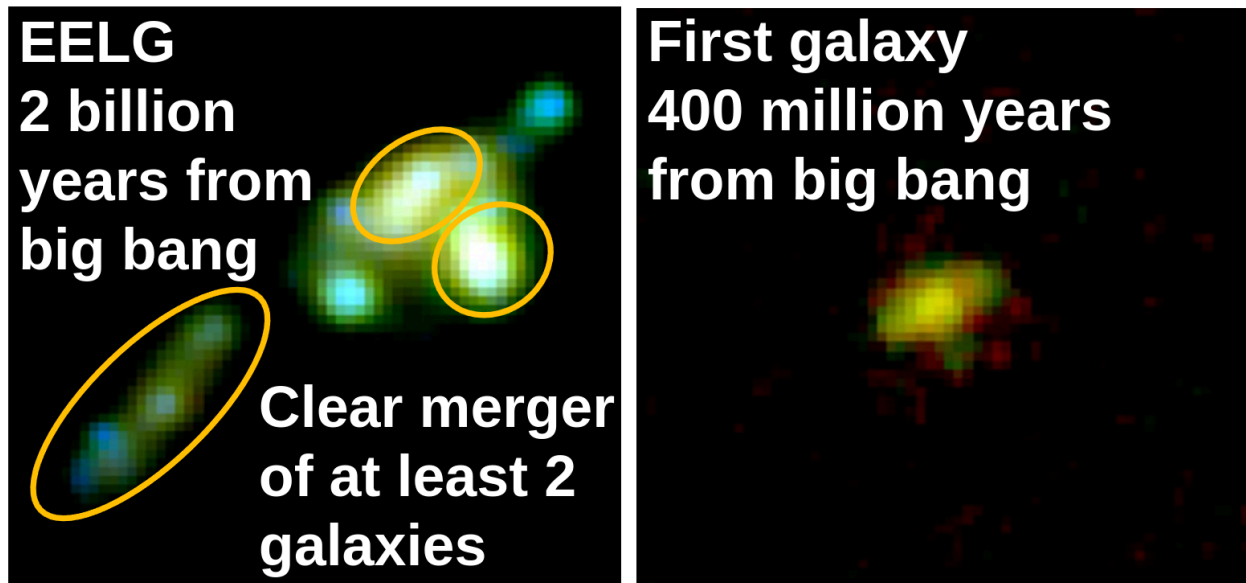


Fig. 1: JWST image of an EELG at $z \sim 3$ (left) and a galaxy that existed within the first billion years (right). Both galaxies share the same internal properties, even though they exist at different times. The brighter and larger size of EELGs helps us probe the site of star formation in details, an extremely challenging feat in the first galaxies.