GLEAM-X: Exploring the Universe in Radio Colour

Supervisor:
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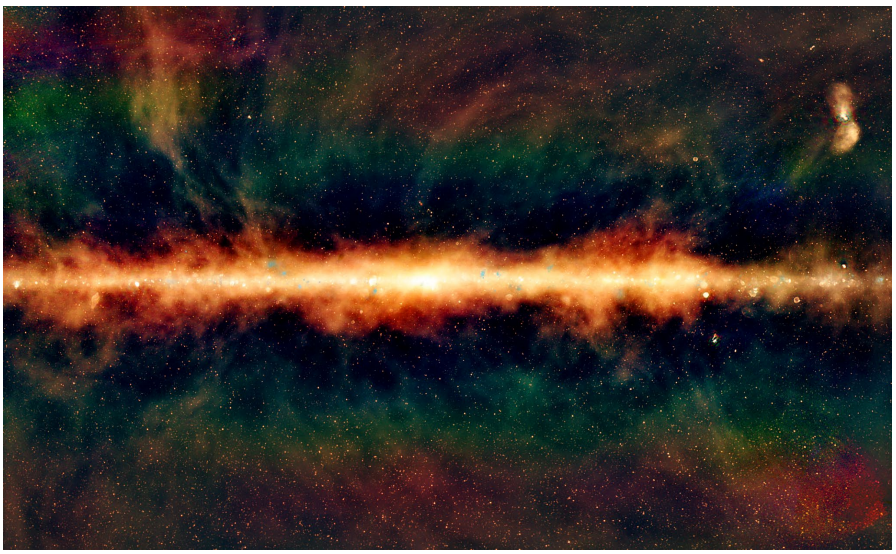
Description:
The Murchison Widefield Array (MWA) is a low-frequency (80 — 300 MHz) radio telescope operating in Western Australia and the only precursor telescope to the low-frequency part of the Square Kilometer Array, which will be the world's largest radio telescope. One of the largest science programs for the MWA is the GaLactic and Extragalactic All-sky MWA (GLEAM) survey, which has surveyed the entire visible sky for two years since the MWA commenced operations. GLEAM has enabled studies of dying radio galaxies, supernova remnants, clusters of galaxies, and the Earth's ionosphere. It also brought a colourful radio view of the sky to public attention; see e.g. this TED talk: http://bit.ly/nhwted.

The MWA has now been upgraded to double the resolution, and the new GLEAM-eXtended (GLEAM-X) survey has successfully observed half of the sky, with the final data to be obtained in late 2022. The increased resolution enables images 10x deeper to be created, potentially revealing millions of new radio sources over the next few years. Combining the GLEAM and GLEAM-X datasets will create the most sensitive wide area survey output from the MWA ever. The wide bandwidth of the MWA makes possible in-band spectrum measurements of many objects, which directly informs us of their astrophysics.

Aims of the project:

1. Process GLEAM-X data to generate widely useful images and catalogues;
2. Undertake a focused research project that utilizes the data. This could include (but is not limited to): studies of transient or variable radio sources, scintillation, the ionosphere, continuum or polarisation studies of objects such as radio galaxies, galaxy clusters, supernova remnants, and pulsars, or synthesis of wide-area measurements to investigate cosmological effects;
3. Publish the results in scientific papers and at conferences.

The PI is supported by an Australian Research Council Future Fellowship to deliver the GLEAM-X survey and science therefrom, and works with a strong research and data processing team that will provide a welcoming and supportive environment for the student to learn and apply radio astronomical techniques. Experts in a range of topics are available to co-supervise depending on the student's research interests. The successful applicant will have access to the Pawsey Supercomputing Centre, with dedicated compute time available for this project. Support will be provided to apply for follow-up time on relevant national and international telescope facilities.



GLEAM explores the Universe in radio colour; see https://gleamoscope.icrar.org.