Testing Cosmology with Next Generation Radio Surveys

Extra-galactic radio surveys are dominated by luminous radio sources powered by super-massive back holes. These outshine their host galaxies by orders of magnitude hence can be detected at extreme distances (much further than surveys at other wavelengths). The mean distance of these radio sources is about halfway back to the Big Bang. With large numbers of radio sources constraints can be made on various aspects of cosmology. Such cosmological studies are a key science goal of the Square Kilometre Array (SKA) and with continuum surveys from the Australian SKA Pathfinder.

Research Field
Radio Astronomy

Project Suitability
PhD
Masters/Honours

Project Supervisor
Dr Nick Seymour
Nick.Seymour@curtin.edu.au

Co-Supervisors
Dr Natasha Hurley-Walker

This project will use the next-generation all-sky survey from the Murchison Widefield Array, GLEAM-X, to perform cosmological studies. This project would include some hands processing to contribute to the production of GLEAM-X, but would mostly be focusing on the cosmological projects described below:

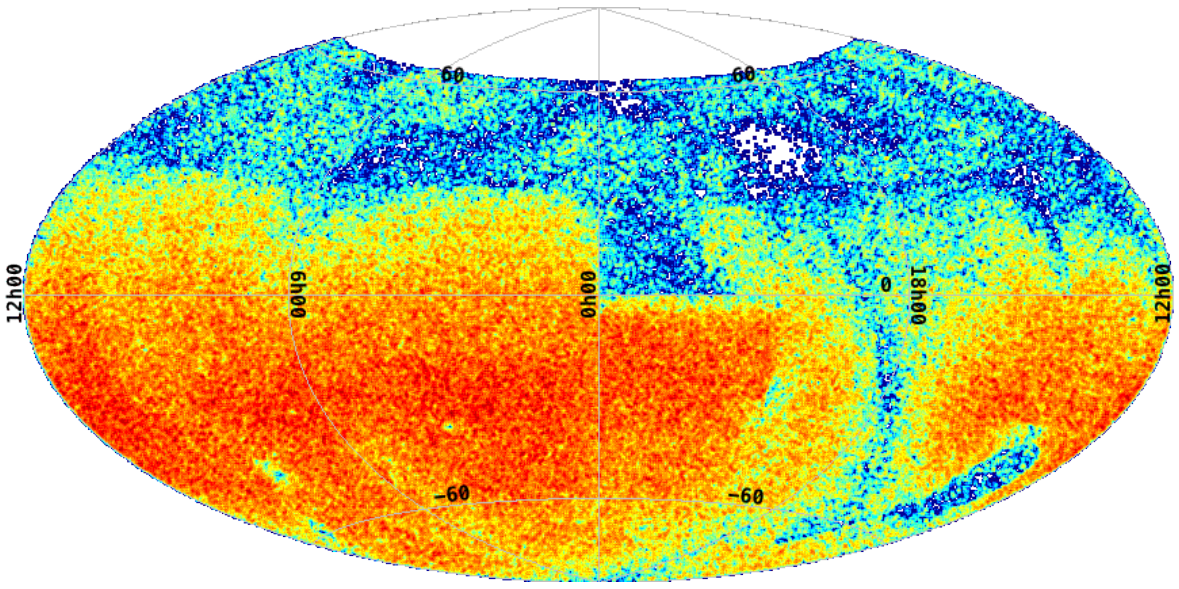
(i) use the all-sky and deep MWA surveys to determine the source counts as a function of frequency and use these to constrain models of radio galaxy evolution and the measurement of the extragalactic background light,

(ii) use the all-sky distribution of GLEAM-X sources to independent measure the dipole of the cosmic microwave background due to our galaxies movement relative to the absolute frame of reference,

(iii) study the cross-correlation of the distribution of radio sources in the all-sky image to constrain the bias factor of these powerful radio galaxies,

(iv) cross-correlate this survey at different frequencies to infer the redshift distribution of the whole sample.

Fig 1: sky distribution of radio sources which are part of the GLEAM-X pipeline with a shading related to their space density.



#