

Title

**Polarisation of embedded radio lobes in galaxy groups -- a pilot study**

Abstract

We propose a pilot L-band polarisation study of a unique and representative sample of seven nearby FR II radio galaxies in group environments with known gas density distributions and internal lobe conditions from deep X-ray observations. Galaxy groups are the typical galaxy environment during the peak of star formation and black-hole growth, and their gas distributions are highly sensitive to stellar and black-hole feedback at high redshift. If radio polarisation diagnostics of galaxy group environments can be developed using MeerKAT's excellent combination of sensitivity and bandwidth, this will open up the possibility of studying the baryonic content of typical galaxy environments at cosmic noon. With this pilot study we will map the polarisation structures of a representative sample of classical double radio galaxies in group-scale environments for the first time, enabling systematic comparisons of polarisation structure with measured environmental electron density profiles, group X-ray luminosity and mass, and enabling inference of intragroup magnetic field distributions with the aid of realistic MHD simulations of radio galaxy evolution. Our results should inform future large population studies at redshifts where environmental density information is not directly available.