

Title

Precessing Jets with LOFAR and MeerKAT

Abstract

Precession is created by regular perturbation at the core of radio-loud AGN during active jet generation. One hypothetical cause of precession is the presence of close supermassive black hole binaries at the galactic centre. Predictable patterns in jet morphology have been consistently witnessed in high-resolution numerical simulations. These include multiple hotspots, jet misalignment along the central axis, and symmetric curvature seen in jet and counterjet (except where distorted by relativistic beaming). Such indicators can be readily observed in large, low-redshift radio jets. More 'extreme' precession signatures are more likely to be produced by true supermassive black hole binaries as opposed to accretion disk dynamics or black hole reorientation.

Recent studies with the LOFAR Two-metre Sky Survey (LoTSS) have revealed a large population of candidate precession sources across the whole Northern sky. This population shows little preference in terms of angular size or luminosity but the number of precession indicators appears weakly associated with galaxy mass, where a higher prevalence of precession indicators appears associated with increasing galaxy mass. In this proposal, we seek MeerKAT follow-up of a small number of LoTSS-selected objects at low declination. The candidate sources are all selected to contain all precession indicators and as such are the most likely candidates for supermassive binaries.

It is particularly valuable to study these sources with MeerKAT given the potential for long-term follow-up with continuous wave observations in the supermassive regime likely to become possible in the coming decades. Such work will favour low-declination sources.