

Title

Searching for the origin of the Odd Radio Circles

Abstract

The Odd Radio Circles (ORCs) are a fascinating new class of astronomical objects discovered in 2021, characterized by distinct circular radio emissions with diameters ranging from 300 to 600 kpc. To date, only eight ORCs have been detected, and their origin remains a mystery. There are several proposed scenarios suggesting as a possible origin mechanism of ORCs.

To constrain these, deep multi-frequency radio observations and spectral studies are essential. For instance, scenarios involving shock acceleration would result in a flatter spectrum, whereas models of remnant AGN lobes would produce aged electrons with a steeper/curved spectral index. This proposal aims to utilize the MeerKAT telescope to conduct an in-depth study of four selected ORCs: ORC J1555+2726 (ORC 4), ORC J0102-2450 (ORC 5), SAURON, and Cloverleaf ORC in the L-band (900-1670 MHz). These ORCs have been chosen based on their declination, confirmed redshifts, and unique structural properties, providing a diverse sample for investigation. The primary goals are to elucidate the true morphology, spectral properties, and polarization characteristics of these ORCs, thereby enhancing our understanding of their origins and the physical mechanisms driving their emissions.