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Type: **Contributed talk**

Polarization Characteristics of Active Solar Radio Emissions: Studies with SKAO Precursors and Pathfinders

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Solar radio bursts are among the most extensively studied radio phenomena originating in the solar corona and serving as valuable probes of the coronal medium. Their polarization properties are particularly sensitive indicators of coronal magnetic fields, which have historically been difficult to measure. Despite these advantages, instrumental and algorithmic limitations have restricted the use of imaging techniques for solar and coronal studies at low radio frequencies. Most existing research is based on analyzing dynamic spectra, which do not provide imaging information.

This is now set to change due to two primary reasons. The first is the availability of the next-generation telescopes, such as the Murchison Widefield Array (MWA), LOw Frequency ARray (LOFAR), and the upgraded Giant Metrewave Radio Telescope (uGMRT), all precursors or pathfinders for the Square Kilometre Observatory (SKAO) expected to become available by the end of this decade. The second is the advances in calibration and imaging algorithms, which have enabled the generation of high fidelity, full polarimetric spectroscopic snapshot images of the Sun from the data obtained using these instruments. These images facilitate the study of active emissions varying on small spectral and temporal scales.

We have conducted full polarization imaging studies of multiple active solar radio emissions using MWA, LOFAR, and uGMRT. Our findings reveal that these emissions are predominantly circularly polarized, with polarization fractions exhibiting significant variation, and almost always remaining significantly lower than theoretical expectations. Notably, the location of the polarized sources appears to be shifted by several arcseconds to few arcminutes relative to total intensity sources with the polarized source being more compact, hinting that a substantial amount of polarization might have been lost due to scattering.

We will summarize our results and discuss their potential implications.

Contribution Type

Theme

Connecting Solar Corona to Heliosphere

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