

Unveiling fossil plasma sources with Decameter observations

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The largely unexplored decameter radio band (10-30 MHz) provides a unique window for studying a range of astronomical topics, and in particular, for studying the non-thermal plasma permeating galaxy clusters. Recent work by Groeneveld et al. (2024, *subm.*) has effectively opened up this wavelength range for astronomical observations by providing a calibration strategy to correct for the severe ionospheric perturbations. In this presentation, we present images at decameter wavelengths with unprecedented sharpness. This represents more than an order of magnitude improvement over previous decameter studies, both in terms of resolution (45 arcseconds) and sensitivity (12 mJy RMS noise). We have identified four fossil plasma sources in the region surveyed. These rare sources are believed to contain old, possibly re-energised, radio plasma originating from previous outbursts of active galactic nuclei. Notably, two of these sources display the steepest radio spectral index among all the sources detected ($\alpha = -1.8$ and -1.4). This indicates that fossil plasma sources constitute the primary population of steep-spectrum sources at these frequencies, emphasising the large discovery potential of ground-based decameter observations.

keywords

Galaxy clusters, calibration, survey overview, LOFAR, decameter, fossil plasma

In-person or online?

in-person

Career level

Student

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