

# Unveiling Magnetic Fields From Star Forming Regions to Diffuse ISM in M31

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Magnetic fields play an important role in the energy balance and structure formation in the interstellar medium (ISM) of galaxies. However, the origin of the magnetic fields on different spatial scales and the link between them are still pressing questions. The Andromeda Galaxy (M31) is an ideal laboratory to investigate the magnetic field from kpc scales down to scales of star-forming regions. To measure the field structure, we need high-resolution and high-sensitivity data of polarized intensity as well as Faraday rotation (RM) measures. Thanks to the VLA, RM synthesis can be performed on scales of ~60-100pc and also with high resolution in the Faraday spectrum. We propose L, S, and C band observations of two segments in the 10-kpc ring of M31 to 1) discriminate between the tangled and coherent fields as a function of scale, 2) study the 3-D structure of the coherent field, 3) understand the link between the field in star-forming regions and in the diffuse ISM, and 4) assess amplification theories of the magnetic field.

## keywords

ISM-Magnetic field-star-formation

## In-person or online?

in-person

## Career level

Student

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**Session Classification:** Poster Sparklers