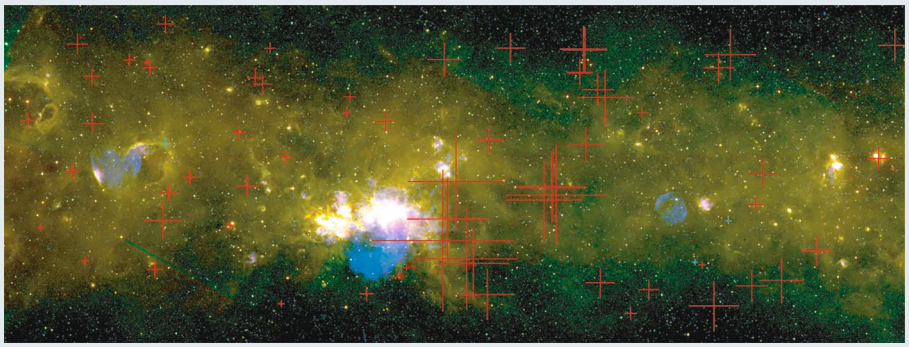
MILKY WAY

Our Galaxy under THOR's gaze

Light travelling through a magnetized medium suffers a change in its polarization, Faraday rotation, that depends on the length of its path within the magnetized medium, the strength of the medium's magnetic field and its electron density. Russell Shanahan and collaborators utilized The H I/OH/Recombination line (THOR) survey to study Faraday rotation against the Sagittarius arm of the Milky Way and discovered evidence for a region of condensed warm ionized medium (WIM) — 10^4-K gas surrounding the Milky Way — that eventually may cool down sufficiently to feed star formation regions within the Galactic arm (*Astrophys. J. Lett.* **887**, L7; 2019).



Credit: J. Stil/University of Calgary/MPIA

THOR survey used the Karl G. Jansky Very Large Array to map the Sagittarius arm in the radio, including continuum emission between 1 and 2 GHz, and line emission that includes atomic hydrogen and hydroxyl. Based on these maps, the authors identified and characterized the Faraday rotation measure (RM) of 127 compact polarized extragalactic sources, lying behind the Galactic arm in the longitude range $39° < l < 52°$. Interestingly, the team found an unexpected number of sources with Faraday RM > 1,600 rad m^{-2} around a longitude of ~48° (pictured; larger red crosses mark higher RM values). Such a spike would imply an elevated magnetic field strength or electron density in that region.

To understand the origin of this anomaly, Shanahan et al. compared their data with known positions of star-forming regions (bright yellow regions in the picture, associated with higher RM values) but found them not to be spatially correlated. Instead, the authors believe that the high RMs can be explained as a result of a compressed region of the WIM just upstream of a massive H II region. If their interpretation is correct, this finding suggests that fast radio bursts previously reported to have very high RMs (and for which exotic environments have been invoked) could instead be located behind similar Faraday screens in the spiral arms of their hosts. ❐

Marios Karouzos

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