

Local interstellar magnetic field, Loop I, and interstellar clouds

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Before reaching the Earth, galactic cosmic rays must traverse nearby partially ionized low density interstellar clouds. The evolved superbubble known as Loop I appears to order the cloud kinematics and the magnetic field of the interstellar medium (ISM) within tens of parsecs. The direction of the nearby interstellar magnetic field (ISMF) that is found from starlight polarized in the local interstellar medium is approximately parallel to the local surface of the Loop I shell that dominates the northern hemisphere. Nearby interstellar clouds flow through the local standard of rest with a direction that is perpendicular to the ISMF direction, to within the uncertainties. The direction of the ISMF helping to shape the heliosphere is found from the center of the Ribbon of energetic neutral atoms discovered by the Interstellar Boundary Explorer (IBEX) spacecraft, and is close to the local field direction found from polarization data. Open questions remain. The structure of the distant parts of Loop I is filamentary and there is evidence for filamentary structure in the local ISM. The role of flux freezing in local gas is unknown. The polarity of the magnetic field is not clear.

Summary

The connections between the local interstellar magnetic field, local clouds, and the evolved Loop I supernova remnant are reviewed.

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