

SUBMILLIMETER POLARIMETRY OF SAGITTARIUS A

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Abstract.

We present the first submillimeter polarimetric observations of Sagittarius A.

During observations at the Caltech Submillimeter Observatory in April 1997, we detected 350 micron polarization towards several regions in Sagittarius A. We used the University of Chicago polarimeter, Hertz (Schleuning et al. 1997, Dowell et al. 1997) for these observations. Our results are shown in Figure 1.

Far-infrared polarimetry of the Galactic Center region (see references in review by Davidson 1996), led to the hypothesis that the magnetic fields inside dense molecular clouds at the Galactic Center are wound up into a globally azimuthal configuration (Davidson 1996, Novak et al. 1997). Our results can be used to test this hypothesis. The best cloud for this purpose is the 20 km/s cloud, because Sgr A(West) is a unique source, and the 50 km/s cloud has been strongly affected by Sgr A(East). The curved compression front along the western edge of the 50 km/s cloud (see Fig. 1) is caused by the expansion of Sgr A(East), and one would thus expect the field in the compressed region to be parallel to this elongated feature.

As predicted by the hypothesis, the field in the 20 km/s cloud, like that observed in the envelope of Sgr B2 (Novak et al. 1997), is approximately parallel to the Galactic plane. For the 50 km/s cloud, it is interesting that

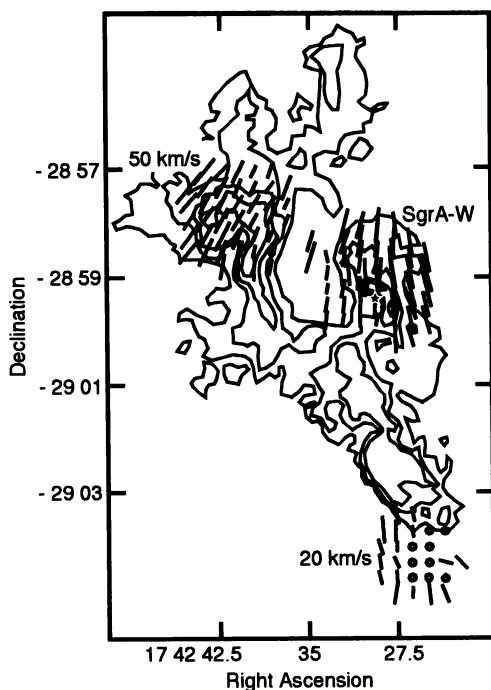


Figure 1. Submillimeter polarimetry of Sgr A. Vectors indicate inferred magnetic field directions. Circles show points with low polarization. The typical level of polarization is 1.5 %. Contours are from the 800 micron map of Dent et al. (1993). We observed three positions: Sgr A(West), and the peaks of the 50 km/s and 20 km/s clouds. The map of Dent et al. does not extend as far south as the peak of the 20 km/s cloud.

the expected parallelism between field and compression front is not limited to the compression front itself, but rather extends across the entire portion of the cloud that we mapped. This suggests that the effects of A(East) have penetrated further into the cloud than one would infer from the appearance of the submillimeter photometric maps.

References

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