

MAGNETIC FIELDS AND THE INTERSTELLAR MEDIUM IN SPIRAL ARMS

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We performed the high frequency radio studies of spiral galaxies using the 100 m MPIfR radio telescope at 10.55 GHz. Two objects: NGC 4254 and NGC 3627 possess perturbed spiral structures while two others, NGC 3521 and NGC 5055 are flocculent objects, lacking organized spiral patterns. NGC 3521 possesses also a peculiar dust lane. For NGC 4254, NGC 3627 and NGC 5055 deep polarization maps were made, for NGC 3521 the total power data only were analyzed (see Urbanik et al. 1989).

We found that the uniform magnetic field component yielding a symmetric spiral pattern of observed polarization B-vectors may exist away from spiral arms, in regions of chaotic spiral structures or in the absence of "grand-design" spiral arms (details can be found in Soida et al. 1995). Axisymmetric fields generated by e.g. a dynamo action (Elstner et al. 1992) constitute a good candidate for this component. This axisymmetric field may be locally strongly modified by compressional phenomena like the formation of dust lanes or external interactions with the ambient gas. The uniform fields tend to be enhanced in dust lanes and to run along them. However, this process may be counteracted by the uniform field destruction if the dust lane is accompanied by regions of an intense star formation.

References

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