Poster Contributions: Polarisation

INTERNAL FARADAY ROTATION IN COMPACT RADIO SOURCES (CRS)

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ABSTRACT. Standard inhomogeneous synchrotron models can explain the polarization properties of CRS if proper account is taken for internal Faraday rotation; neither depolarization due to synchrotron self-absorption nor a tangled magnetic field plays an important rôle. The effects of inhomogeneities are important; the polarization properties of flux escaping from a Faraday thick region are quite different from those coming from a homogeneous source. The observed polarization of strong lined CRS indicates (i) a jet with constant opening angle, (ii) a large scale magnetic field whose main component is along the jet axis and (iii) the density of Faraday rotating electrons scales with radial distance in the same way as does the density of synchrotron emitting ones. Furthermore, the preferred values of both the degree of polarization and the polarization angle, as well as their approximate frequency independence, are consistent with the assumption that the Faraday rotating electrons and the synchrotron emitting electrons belong to the same energy distribution; the former being the non/semi-relativistic end of the latter. The source properties of weak lined CRS (BL Lac objects) are harder to infer, mainly because much of the polarized flux remains unresolved even at the VLBI-scale. The weak polarization structure in BL Lac objects might be due to shocks and no Faraday rotation but it can also be accounted for with a jet structure similar to the one inferred for the strong lined CRS. Although an efficient Fermi-type acceleration mechanism can not be excluded, the polarization characteristics of Faraday thick shocks in a jet make them unlikely as acceleration sites.

The polarization properties of the VLBI-core are not those expected from the unresolved inner parts of the jet structure deduced from the resolved emission. Instead it seems likely that the VLBI-core consists of two components; in addition to the inner part of the jet, there is a component which is directly related to the optical blazar emission region. Time variations and the properties of the circular polarization imply that the latter, blazar component, is characterized both by a large scale magnetic field and large Doppler factors. Relativistic streaming in the blazar component is important; for example, the gross features of the initial phases of radio outbursts can be explained in a scenario where the streaming electrons are pitch angle scattered.

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