

On the alignment between magnetic fields and structures of interstellar dust as seen by Planck

Andrea Bracco on behalf of the Planck Collaboration
Institut d'Astrophysique Spatiale (IAS), France
andrea.bracco@ias.u-psud.fr

The role of the magnetic field in the formation of the filamentary structures observed in the interstellar medium has not been elucidated yet.

For the first time Planck all-sky maps of linear dust polarization in emission give the possibility to study the correlation between the structure of the Galactic magnetic field and matter over the whole sky both in the diffuse interstellar medium and in molecular clouds.

We will present an analysis of the Planck data that compares the projected direction of the interstellar filamentary structures, derived from the dust opacity map, with that of the magnetic field, inferred from the dust polarization data.

We perform our analysis over two orders of magnitude in column densities, ranging from the diffuse medium up to gravitationally bound filaments.

Under equipartition between turbulent and magnetic energy, we find a statistical tendency of alignment between the orientation of matter and the Galactic magnetic field. This result is the most striking for interstellar structures with high polarization degree and low column density. We quantify the degree of matter-magnetic field alignment with analytical models that account for projection effects.

We will discuss our results in the context of theoretical studies of the formation of structures in the magnetized interstellar medium.