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Intense velocity-shears, magnetic fields and filaments in diffuse gas

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Abstract. The dissipation of turbulence is a key process in the evolution of diffuse gas towards denser structures. The vast range of coupled scales and the variety of dissipative processes in interstellar turbulence make it a complex system to analyze. Observations now provide powerful statistics of the gas velocity field, density and magnetic field orientations, opening a rich field of investigation. On-going comparisons of the orientation of intense velocity-shears, magnetic field and tenuous filaments of matter in a turbulent high-latitude cloud are promising.

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Turbulent dissipation is intermittent in space and time and it is now identified in the ISM via the non-Gaussian statistics of the velocity field. Parsec-scale coherent structures of intense velocity–shears have been found in the CO line emission of a diffuse molecular cloud in the Polaris Flare (Hily-Blant *et al.* 2008). One of them is structured into narrow shear-layers down to the milliparsec–scale with straight projections on the plane of the sky (POS) and widely different orientations (Falgarone *et al.* 2009). Each of the main shear orientations in the mpc-field can be found in the pc-scale structures.

The POS projections of the magnetic field have been studied via the polarization of starlight: (i) at the 30 pc-scale, in the visible, with the Beauty and the Beast polarimeter. The distribution of the 50 position–angles (PA) in the 30 pc field is also broad, (ii) at the 0.1 pc–scale with the Mimir polarimeter (Clemens *et al.*, 2012) in the near IR. Interestingly the 7 measured polarization PAs cover the same broad range as those of the 30 pc field, and a few of them are parallel to the local structure of intense velocity-shear. Last, the orientations of the striations in dust emission maps of the large scale field have also been studied. The remarkable similarity of the three PA distributions (magnetic field, velocity-shears and dust filaments) supports a close connection not only between large and small scales but also between the topology of **B** with that of the most dissipative structures and tenuous filaments of matter. Recent *Herschel*/SPIRE observations further support this view.

References

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