# The interaction of a magnetized plasma wind with strongly magnetized bodies in HEDP experiments

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The occurrence and interactions of fast-streaming, magnetized plasmas are ubiquitous in both space and astrophysics, where plasma winds flow past magnetic planets and stars. This can result in a wide range of fundamental plasma physics processes such as the formation of MHD shocks, magnetic turbulence, magnetic reconnection and wave-particle interactions. Laboratory experiments and simulations can play an important role in complementing observations and space-craft measurements of such phenomena.

Here we present experiments using a plasma wind, generated by the ablation of a pulsed-power driven exploding wire array, which interacts with obstacles placed in the path of the plasma flow. The plasma wind is super-Alfvénic ($V_{flow}>2V_A$), and contains an embedded magnetic field (B~2T, $Re_M$~100). A fraction of the drive current is used to magnetize the obstacles placed in the flow. The level of magnetization of the obstacle, as well as the magnetic field geometry and orientation of the obstacle can be controlled, in order to study a range of interaction types and topologies (e.g. cylindrical or dipolar magnetic fields). The choice of the plasma wind material also allows a variation of the collisionality of the plasma, as well as the strength of radiative cooling.

The detailed structure of the interactions is measured using Thomson scattering, laser interferometry and Faraday polarimetry diagnostics, providing measurements of the flow velocity, plasma temperature, electron density and magnetic field distributions of the plasma. The results show how the variation of the magnetization of the obstacles affects the shape of the bow shock and the stand-off distance between the shock and the obstacle. The experimental results are compared with the results from resistive MHD simulations.

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