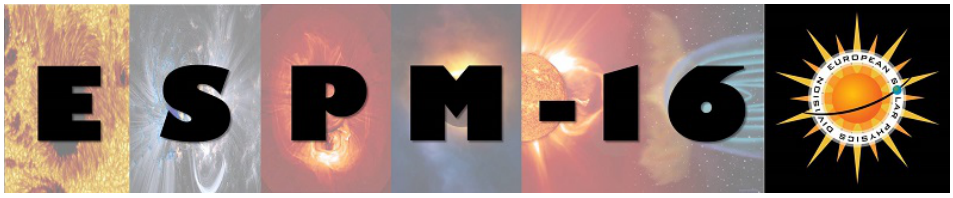

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Simulations of the Biermann battery mechanism in two-fluid partially ionised plasmas

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In the absence of an initial seed, the Biermann battery term of a non-ideal induction equation acts as a source that generates weak magnetic fields. These fields are then amplified via a dynamo mechanism. The Kelvin-Helmholtz instability is a fluid phenomenon that takes place in many astrophysical scenarios and can trigger the action of the Biermann battery and dynamo processes. In this talk, I will present the results from a study in which we investigated the effect that the ionization degree of the plasma and the interaction between the charged and neutral species have on the generation and amplification of these weak magnetic fields. We used the two-fluid model implemented in the numerical code MANCHA-2F to perform 2D simulations. We chose plasma parameters that correspond to the solar chromosphere and a setup with no initial magnetic field and which is unstable due to a velocity shear. We explored a wide range of ionization degrees of the plasma and analyzed the role that the different collisional processes included in the model play on the generation and growth of the magnetic field during the evolution of the Kelvin-Helmholtz instability. We also studied the dependence of the Biermann battery mechanism on the total density of the plasma and the coupling degree between the two fluids. Finally, we performed a comparison of our results with those predicted by a single-fluid model.

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