# ON THE COMPETITION AMONG MAGNETIC AND HYDRODYNAMIC INSTABILITIES IN MAGNETIZED SHEARED PLASMA FLOWS

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The Kelvin-Helmholtz, the Rayleigh-Taylor and the Magnetic Reconnection instabilities are the main actors on the stage of the nonlinear dynamics of a magnetized plasma, as they can be driven unstable directly or indirectly, i.e., in the form of "secondary instabilities", by inhomogeneities in the plasma velocity, in the plasma density (or pressure) and in the plasma currents. In general these instabilities do not occur separately and the final state of the system depends on their nonlinear interaction.

The complex nonlinear interaction between these instabilities is governed by the time scales of the different processes at play. These involve both the large spatial scales (velocity and magnetic shear lengths, combined with the density inhomogeneity scale length) from which the initial drive of the instabilities originates, and the small spatial scales that are formed by the evolution of the hydrodynamic instabilities and where magnetic field line reconnection can occur. The timing between the different instability onset and growth will determine the structure of the final configuration that the system can reach.

The qualitative differences (not simply quantitative differences) between the possible final states can in principle be used as a diagnostic tool in order to determine experimentally how fast these instabilities evolve in the different plasma regimes on the clock on the clock set by the large scale evolution.

In this presentation we present recent results that have been obtained on the interplay between large scale and small scale dynamics in the framework of the interaction between the solar wind and the Earth's magnetosphere.