



Planetary magnetism and laboratory dynamos

Stephan Fauve

LPS, Ecole normale supérieure, Paris (fauve@lps.ens.fr)

After a short review of dynamo mechanisms and their relevance for planetary magnetic fields, I will discuss scaling laws for the magnetic energy density and the energy budget of a dynamo. I will then present the results of a recent experiment (the "VKS experiment") showing the generation of magnetic fields by the fully turbulent motion of a liquid sodium flow. Although this flow differs from the one in the Earth liquid core, magnetic field reversals have been observed and display a hierarchy of time scales similar to the Earth's magnetic field: the duration of the steady phases is widely distributed, but is always much longer than the time needed to switch polarity. In addition to reversals, excursions also occur. Both coincide with minima of the mechanical power driving the flow. These results as well as other time dependent regimes, can be understood in the framework of dynamical system theory.