# MHD dynamo in Reversed Field Pinch plasmas

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The reversed field pinch (RFP) is a toroidal configuration for magnetic confinement. This configuration is characterized by poloidal and toroidal magnetic fields of the same order of magnitude. The toroidal field reverses at the plasma edge. In addition to the applied toroidal loop voltage, the configuration is sustained by an electromotive force produced by the fluid motion of the plasma: the so called MHD dynamo. Though according to the standard understanding developed in the 80'-90', MHD turbulence would be intrinsic to the RFP dynamo, more recent experimental and theoretical studies go beyond this view and indicate other possible routes for the RFP dynamo. Three-dimensional visco-resistive MHD simulations display a transition from multiple helicity (MH) states to single helicity (SH) steady-states when dissipation is increased. These SH states provide a laminar dynamo for the RFP.

In this presentation we focus on the features of both the laminar and the turbulent RFP dynamos [1,2,3]. Aspects related to the electrostatic nature of the RFP dynamo [3] are found particularly convenient to discuss the similarity of these regimes.

[1] S. Cappello and D.F. Escande,"*Bifurcation in viscoresistive MHD: the Hartmann number and the RFP*",
Phys. Rev. Lett. 85-18 (2000) 3838

[2] S. Cappello,"*Bifurcation in the MHD behaviour of a self-organizing system: the RFP*",
Plasma Phys. Control. Fusion 46 (2004) B313-B325

[3] D.Bonfiglio, S.Cappello, D.F.Escande, "*Dominant electrostatic nature of the Reversed Field Pinch dynamo*", Phys. Rev. Lett. 94, 145001 (2005)