

Microwave excitation in ECRIS plasmas

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A number of phenomena related to electron cyclotron resonance ion sources (ECRIS) has been better understood recently by means of a better comprehension of the coupling mechanism between microwave generators and ECR plasma. In particular, the two frequency heating and the frequency tuning effect, that permit usually a remarkable increase of the current for the highest charge states, can be explained in terms of the mode excitation in the cylindrical cavity of the plasma chamber.

Simulation tools based on this theoretical approach have been written, and the major results will be presented.

The key point for the design of the new generation ECRIS as well as for the optimization of the existing ones will be reported, including the possibility to modify the existing microwave generators or to build new device, fully adapted to the ECRIS.

The paper will present the results of the experimental measurements carried out with the ion sources at INFN-LNS and the way to determine the efficiency of the ECR plasma heating will be described.