

## **Lower hybrid current drive at plasma densities required for thermonuclear reactors**

R. Cesario, L. Amicucci, A. Cardinali, C. Castaldo, A. A. Tuccillo and FTU Team

Associazione EURATOM/ENEA sulla Fusione, Centro Ricerche Frascati, 00044 Frascati, Italy

Driving current in high-density plasmas is essential for the progress of thermonuclear fusion energy research based on the tokamak concept. The lower hybrid current drive (LHCD) [1], is potentially the most suitable tool for driving current at large plasma radii, consistent with the needs of ITER steady state scenario. Unfortunately, experiments at reactor grade high plasma densities with kinetic profiles approaching those required for ITER, have shown problems in penetration of the LH power into the core plasma [2,3]. These plasmas represent a basic reference for designing possible methods useful for assessing the LHCD concept in ITER. On the basis of the phenomenology observed during LHCD experiments carried out in different machines, and model of the spectral broadening effect due to parametric instability, an interpretation and possible solution of the related important problem is presented.

[1] Fisch, N.J., *Rev. Mod. Physics*, 59, (1987) 175-234

[2] R. Cesario et al., "Plasma edge density and lower hybrid current drive in JET (Joint European Torus)", subm. to *PFCF*

[3] R. Cesario et al., *Nature comm.*, 1 (5) 55 2010

